# A798 Thermal Receipt Printer

# Programming Guide

**Made under one or more of the following U.S. patents:**
**4886381, 5579043, 5613787, 5651624, 5713678, 5752779, 5789916, 5800080, 5879090, 5887999, 5975776, 6027266, 6085973, 6089450, 6129465, 6155483, 6404452, 6486902, 6504331, 5749277, 6722754, 6739773, 6784909.**

COGNITIVE TPG

**Federal Communications Commission (FCC) Radio Frequency Interference Statement Warning**

**Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**

**Note**

**This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.**

**Information to the User**

**This equipment must be installed and used in strict accordance with the manufacturer's instructions. However, there is no guarantee that interference to radio communications will not occur in a particular commercial installation. If this equipment does cause interference, which can be determined by turning the equipment off and on, the user is encouraged to contact CognitiveTPG immediately.**

**CognitiveTPG is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by CognitiveTPG. The correction of interferences caused by such unauthorized modification, substitution or attachment will be the responsibility of the user.**

**In order to ensure compliance with the Product Safety, FCC and CE marking requirements, you must use the power supply, power cord, and interface cable which are sold for use with this product or which meet the following parameters:**

**Power Supply**

**UL Listed (QQGQ), Class 2 power supply with SELV (Secondary Extra Low Voltage), non-energy hazard output, limited energy source, input rated 100-240 Vac, 1.5/0.8 A, 50/60 Hz, output rated 24 Vdc, 2.3 A for 55 watt unit; 100-240 Vac, 2.0A, 50/60 Hz, output rate 24 Vdc, 3.125 A for 75 watt unit.**

**Use of this product with a power supply other than the CognitiveTPG power supply will require you to test the power supply and CognitiveTPG printer for FCC and CE mark certification.**

**Communication Interface Cable**

**A shielded (360 degree) interface cable must be used with this product. The shield must be connected to the frame or earth ground connection or earth ground reference at EACH end of the cable.**

**Use of a cable other than described here will require that you test the cable with the CognitiveTPG printer and your system for FCC and CE mark certification.**

**Power Cord**

**A UL listed, detachable power cord must be used. For applications where the power supply module may be mounted on the floor, a power cord with Type SJT marking must be used. For applications outside the US, power cords which meet the particular country's certification and application requirements should be used.**

**Use of a power cord other than described here may result in a violation of safety certifications which are in force in the country of use.**

**Industry Canada (IC) Radio Frequency Interference Statement**

**This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.**

**Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.**

**Voluntary Control Council for Interference (VCCI) Radio Frequency Interference Statement**

**This is a Class A product based on the standard of the Voluntary Control**

**Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.**

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**Patents**

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**Web Site**

**http://www.CognitiveTPG.com**

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**Contents**

# Chapter 1: About this Guide

## How to use this guide

This is a supplemental guide providing programming information on CognitiveTPG's A798 printer. It is written for tech-savvy users who are interested in customizing or adjusting printer functionality and is meant to be used in conjunction with the **A798 Thermal Receipt Printer: User Guide**.

If you experience any difficulties during the programming process or feel unsure of adjustments you have made, contact your CognitiveTPG representative for further assistance.

## Where to find the basics

If you are looking for information on setup or basic operation, refer to the **A798 User Guide**. The programming guide assumes that you have the **A798 User Guide** handy for reference or are already familiar with the printer.

## Where to find advanced technical information

This guide contains the most complete information available on programming the printer. If you cannot find what you need here or would like further guidance on how to program the printer, contact an CognitiveTPG representative for assistance.

If you are having problems with the physical operation of the printer, the **A798 Service Guide**, provides in-depth information on diagnostics and service. The **A798 Service Guide** is available to qualified service technicians who have been certified by CognitiveTPG to perform advanced procedures.

## Support

For more advanced procedures and troubleshooting, you may need to refer to the printer's service guide or speak to an CognitiveTPG technical professional. Your representative is able to provide you with necessary information.

For on-line service, refer to the Web site at www.CognitiveTPG.com or e-mail to: support@cognitivetpg.com.

# Chapter 2: Diagnostics and Configuration

The A798 printer performs a number of diagnostics that provide useful information about the operating status of the printer. The following diagnostic tests are available.

- Start-up diagnostics
  Performed during the printer's start-up cycle.
- Runtime diagnostics
  Performed during normal printer operation.
- Remote diagnostics
  Maintained during normal operation and reported in the print test.
- The printer can be configured with the following settings and functions through the configuration menu that is printed on the receipt. For more information on configuring the printer, see "Printer configuration" on page 16.

  Communication interfaces

  Diagnostic modes

  RS-232C settings

  Printer emulations/software options

  Hardware options

## Start-up Diagnostics

When the printer receives power or performs a hardware reset, it automatically performs the startup diagnostics (also known as level 0 diagnostics) during the start-up cycle. The following diagnostics are performed:

- Turn off motors
- Perform boot CRC check of the firmware ROM, test external SRAM, test EEPROM, and test main program CRC

  Failure causes Start-up Diagnostics to stop; the printer beeps and the LED flashes a set number of times, indicating the nature of the failure. The table in the "Indicators" section (page 14) describes the specific tone and LED sequences.
- Check if paper is present
- Return the knife to the home position

  Failure causes a fault condition. The table in the "Indicators" section (page 14) describes the specific tone and LED sequences.
- Check if receipt cover is closed

  Failure does not interrupt the start-up cycle.

When the start-up diagnostics are complete, the printer makes a two-tone beep (low then high frequency), the paper feed button is enabled, and the printer is ready for normal operation.

If the printer has not been turned on before, or a new EEPROM has been installed, the default values for the printer functions will be loaded into the EEPROM during start-up diagnostics.

## Runtime diagnostics

Runtime diagnostics (sometimes called level 2 diagnostics) run during normal printer operation. When the following conditions occur, the printer automatically turns off the appropriate motors and disables printing to prevent damage to the printer:

- Paper out
- Receipt cover open
- Knife unable to home
- Printhead too hot
- Voltages out of range

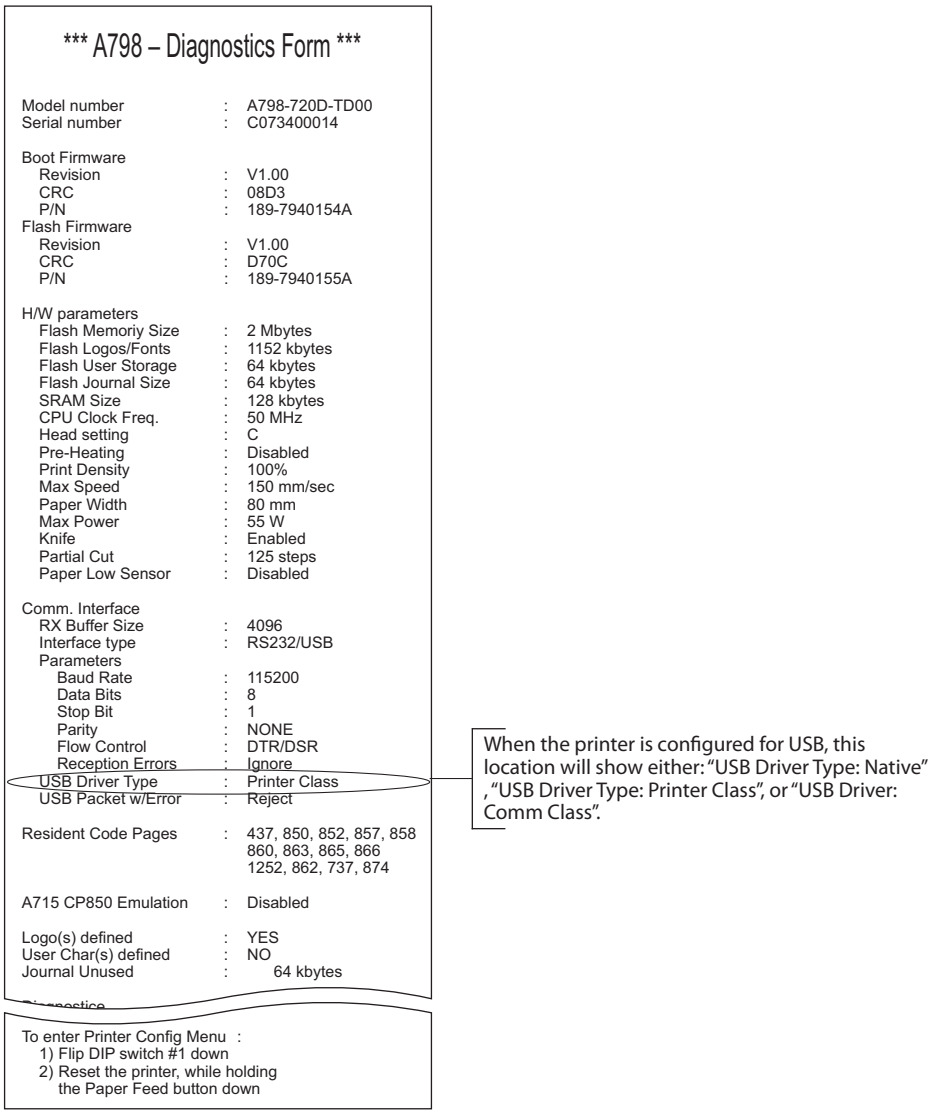
The LED on the operator panel will signal when these conditions occur as well as indicate what state or mode the printer is in.

## Remote diagnostics

Remote diagnostics (sometimes called level 3 diagnostics) keeps track of the following tallies and prints them on the receipt during the print test. See the sample test printout on the next page. These tallies can be used to determine the printer's state of health.

- Model number
- Serial number
- CRC number
- Number of lines printed
- Number of knife cuts
- Number of hours the printer has been on
- Number of flash cycles
- Number of cutter jams
- Number of times the cover is opened
- Maximum temperature reached

(See tallies note on the following page.)


*** A798 – Diagnostics Form ***
Model number : A798-720D-TD00
Serial number : C073400014
Boot Firmware
Revision : V1.00
CRC : 08D3
P/N : 189-7940154A
Flash Firmware
Revision : V1.00
CRC : D70C
P/N : 189-7940155A
H/W parameters
Flash Memoriy Size : 2 Mbytes
Flash Logos/Fonts : 1152 kbytes
Flash User Storage : 64 kbytes
Flash Journal Size : 64 kbytes
SRAM Size : 128 kbytes
CPU Clock Freq. : 50 MHz
Head setting : C
Pre-Heating : Disabled
Print Density : 100%
Max Speed : 150 mm/sec
Paper Width : 80 mm
Max Power : 55 W
Knife : Enabled
Partial Cut : 125 steps
Paper Low Sensor : Disabled
Comm. Interface
RX Buffer Size : 4096
Interface type : RS232/USB
Parameters
Baud Rate : 115200
Data Bits : 8
Stop Bit : 1
Parity : NONE
Flow Control : DTR/DSR
Reception Errors : Ignore
USB Driver Type : Printer Class
USB Packet w/Error : Reject
Resident Code Pages : 437, 850, 852, 857, 858
860, 863, 865, 866
1252, 862, 737, 874
A715 CP850 Emulation : Disabled
Logo(s) defined : YES
User Char(s) defined : NO
Journal Unused : 64 kbytes
To enter Printer Config Menu :
1) Flip DIP switch #1 down
2) Reset the printer, while holding
the Paper Feed button down
When the printer is configured for USB, this location will show either: "USB Driver Type: Native" , "USB Driver Type: Printer Class", or "USB Driver: Comm Class".

*Print test and configuration menu samples will vary per model or printer configuration. (Shown approximately 60% of size.)*

| For more information about | See this section |
|---|---|
| Accessing the remote diagnostic tallies | "Command descriptions" in Chapter 4: Programming commands (Status commands: Transmit printer ID, remote diagnostics extension, Hexadecimal 1D 49 40 n) |

# Indicators

The printer communicates various conditions both visually, with the green LED or audibly, with a series of tones or beeps. The following table lists these indicators.

| Indicator | Sequence | Condition |
|---|---|---|
| LED | Continuous, flashing quickly | Paper out<br>Cover off<br>Knife unable to home |
| LED | Continuous, flashing slowly | Paper is low<br>(if paper low sensor is installed)<br>Printhead too hot<br>Voltages out of range |
| Tone | Two-tone beep<br>(low frequency, high frequency) | Start-up diagnostics completed successfully |
| LED<br>and Tone | Single beep<br>Single LED flash | Boot CRC test failure |
| LED<br>and Tone | Double beep<br>Double LED flash | SRAM test failure |
| LED<br>and Tone | Triple beep<br>Triple LED flash | EEPROM test failure |
| LED<br>and Tone | Four beeps<br>Four LED flash | Dynamic memory initialization failure |
| LED<br>and Tone | Two-Tone beep<br>(high frequency, low frequency)<br>Continuous flashing of LED | Main program CRC test failure<br>Or<br>DIP switch is in on position indicating<br>flash download mode |

The printer is also able to communicate its status to the host application if the application has been programmed to receive this information

| For more information about | See this section |
|---|---|
| Error conditions and correcting them | " Troubleshooting the printer" in *Chapter 4: Using the Printer* in the **A798 User Guide** |
| Communication of printer status to the host application | "Command descriptions" in *Chapter 4: Programming commands*. |

## Printer configuration

Printers are shipped with all the functions and parameters preset at the factory. Settings for various printer parameters can be changed. This menu is printed on the receipt and scrolls through instructions for selecting and changing any of the functions or parameters.

***Caution:*** *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

The following functions and parameters can be changed in the scrolling configuration menu (except as noted):

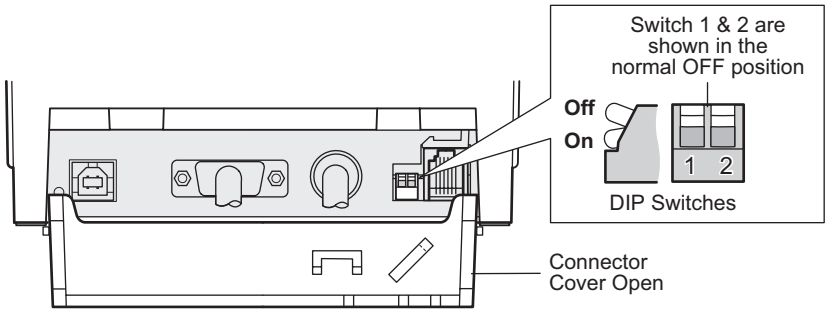
- Communication Interfaces
  - RS-232C serial interface (25-pin)
  - Universal serial bus (USB)/RS232 Serial (9-pin)
  - Parallel
  - Powered USB
- RS-232C serial interface settings
  - Baud rate
  - Data bits (can not be changed)
  - Stop bits (can not be changed)
  - Parity (can not be changed)
  - Hardware (DTR/DSR) or software (XON/XOFF) flow control
  - Data reception errors
  - Alternate DTR/DSR
- Diagnostic Modes
  - Normal
  - Datascope
  - Receipt test
- Printer Emulations
  - Native mode
  - A794 emulation
  - A793 emulation
  - LEGACY emulation
- Printer settings and functions
  - Emulation/Software options submenu
    - Printer ID mode
    - Default lines per inch
    - Carriage return usage
    - Default font
    - Font size
  - Hardware options submenu
    - Color density
    - Monochrome print density
    - Power supply wattage (max power)
    - Knife option
    - Partial cut distance
    - Paper low sensor
    - Paper width
    - Printhead setting

| For more information about | See this section |
|---|---|
| Using the configuration menu to configure the printer | "Configuring the printer" on page 16 |

## Configuring the printer

The configuration menu allows you to select functions or change various settings for the printer. Instructions printed on the receipt guide you through the processes.

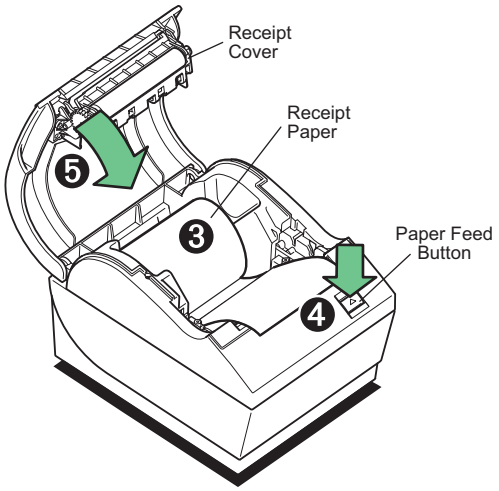
***Caution:*** *Be extremely careful changing any of the printer settings to avoid changing other settings that might affect the performance of the printer.*




**1** Turn power off to printer

**2** Open the connector cover.

**3** Set DIP Switch 1 to ON position (down). DIP Switch 2 should be in the OFF position (up).




**4** Make sure receipt paper is loaded in the printer before proceeding. (For loading instructions, see the *A798 User Guide*) Make sure cover is closed.

**5** Apply power to printer while holding the paper feed button (4) until the configuration printout begins.

- The printer beeps, prints the diagnostics form and the configuration main menu.
- The printer pauses and waits for a main menu selection to be made; short clicks are used, except when answering "Yes" or validating selection (see sample printout).

```
********* MAIN MENU **********
*********************************

Select a sub-menu :
  - EXIT                          -> 1 click
  - Print Current Configuration   -> 2 clicks
  - Set Communication Interface   -> 3 clicks
  - Set Diagnostics Modes         -> 4 clicks
  - Set Emulation/Software Options -> 5 clicks
  - Set Hardware Options          -> 6 clicks
  - Set Paper Type                -> 7 clicks

Enter code, then hold Button DOWN
at least 1 second to validate
```

**6** To communicate with the printer, you will press the paper feed button using either short or long clicks. Use a long click (more than one second) for "yes" and a short click for a "no." Follow the printed instructions to make selections.

**7** Continue through your menu selections until you are asked, "Save New Parameters?" Select "Yes."

**a** Return DIP switch 1 to the OFF Postion (up).

**b** Reset the printer.

**c** Open the receipt cover.

Press and hold the paper feed button while closing the receipt cover.

- The diagnostic printout verifies your new settings.

## Communication interface

To change the communication interface settings, enter the configuration menu, select "Set Communication Interface" from the main menu and answer "Yes" to "SET INTERFACE TYPE?" printed on the receipt.

***Caution:*** *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

Press the paper feed button as instructed to select the communication interface you want.

- Communication interface
  - RS-232C interface: 1 click
  - USB: Auto when no RS-232C activity

## RS-232C serial interface settings

To change the RS-232C serial interface settings, enter the configuration menu, select "Set Communication Interface" from the main menu and answer "No" to "SET INTERFACE TYPE?" printed on the receipt. This will take you to the instructions for selecting the RS-232C settings.

***Caution:*** *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

Press the paper feed button as instructed on the configuration menu to select the RS-232C settings you want to change.

- Baud rate
  - 115200 baud
  - 57600 baud
  - 38400 baud
  - 19200 baud
  - 9600 baud
  - 4800 baud
  - 2400 baud
  - 1200 baud
- Number of data bits (can not be changed)
- Stop bits (can not be changed)
- Parity (can not be changed)
- Hardware flow control
  - Software (XON/XOFF)
  - Hardware (DTR/DSR)
- Data reception errors
  - Ignore errors
  - Print "?"
- Alternate DTR/DSR
  - Enabled
  - Disabled

***Note:*** *Press the paper feed button for at least one second to validate the selection.*

| For more information about | See this section |
|---|---|
| Setting the RS-232C Serial interface settings | "Configuring the printer" on page 16. |

## Diagnostic modes

To change the diagnostic modes enter the configuration menu, select "Set Diagnostic Modes" from the main menu and select one of the following modes:

- **Normal:** normal operating mode of the printer.
- **Datascope:** the receipt printer prints incoming commands and data in hexadecimal format to help troubleshoot communication problems.
- **Receipt test:** the receipt printer prints two code pages to verify proper printing of the receipt.

***Caution:*** *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

See "Configuring the printer," for instructions on how to enter the configuration menu.

## Enable or disable data scope mode

The data scope mode test prints a hexadecimal dump of all data sent to the printer: "1" prints as hexadecimal 31, "A" as hexadecimal 41 and so on. This helps troubleshoot communication problems and runs during a normal application (after being enabled through printer configuration).

***Note:*** *Data scope mode is usually considered a level 1 diagnostic test.*

Data scope mode is enabled and disabled by selecting the "Diagnostic Modes" sub-menu of the configuration menu.

Press the paper feed button as instructed on the "Diagnostic Modes Menu" to enable or disable the data scope mode test.

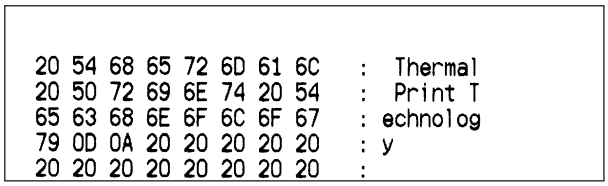
- Off, normal mode (Data scope mode disabled)
- Data scope mode (enabled)

***Note:*** *Press the paper feed button for at least one second to validate the selection.*

### To run the data scope mode:

1. After you have enabled the data scope mode, exit the configuration menu.
2. Run a transaction from the host computer.

   All commands and data sent from the host computer will be printed as hexadecimal characters as shown in the illustration.




### To exit the data scope mode:

1. Enter the configuration menu again.

   See "Configuring the printer."
2. Disable the data scope mode.
3. Exit the configuration menu.

   The printer is on-line and can communicate normally with the host computer.

| For more information about | See this section |
|---|---|
| Enabling the data scope mode | "Configuring the printer" on page 16 |

## Enable or disable receipt test mode

The receipt test mode verifies proper receipt printing. Receipt test is enabled and disabled by selecting the "Diagnostic Modes" sub-menu of the configuration menu. See "Configuring the printer" for instructions on how to enter the configuration menu.

**To run the receipt test mode:**

1. Enable the receipt test mode in the configuration menu.
2. Exit the configuration menu.
3. Push the paper feed button. The receipt station prints two code pages and cuts the receipt.
4. To repeat this test, push the paper feed button again.

**To exit the receipt test mode:**

1. Enter the configuration menu again. (See "Configuring the printer.")
2. Disable the receipt test mode.
3. Exit the configuration menu.

   The printer is on-line and can again communicate normally with the host computer.

## Electronic Journal Datascope Diagnostic

1F 03 18 02 n=1, turn on electronic journal datascope, run time only

1F 03 18 02 n=0, n>1, turn off electronic journal datascope, run time only

1F 03 18 03 n=1, turn on electronic journal datascope, configuration saved over power cycle

1F 03 18 03 n=0, n>1, turn off electronic journal datascope, configuration saved over power cycle

When enabled, "Auto Journal : Datascope" prints on the second diagnostic page.

This diagnostic is for debugging purposes, and should be used only under the direction of customer support.

## Printer emulations

To change the printer emulations settings, enter the configuration menu, select "Emulation/Software Options" from the main menu and answer "Yes" to "Set the printer emulations?" printed on the receipt. This will take you to the instructions for setting the printer emulation.

***Caution:*** *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

Press the paper feed button as instructed to select the printer emulation you want.

- Native mode
- A794 emulation
- A793 emulation
- LEGACY emulation

***Note:*** *The A793, A794 and Legacy Command emulations do not recognize the ColorPOS ® commands.*

***Note:*** *Press the paper feed button for at least one second to validate the selection.*

| For more information about | See this section |
|---|---|
| Setting the printer emulation | "Configuring the Printer" on page 16 |

## Printer settings and functions

To change the printer settings and functions, enter the configuration menu, select the sub-menu from the main menu and answer the questions printed on the receipt until you come to the instructions for selecting the printer settings.

***Caution:*** *Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.*

Press the paper feed button as instructed to select the printer settings you want.

### Select the emulation/software options sub-menu to set:

- Printer ID mode

  This function is used to determine what printer ID value is returned in response to a Transmit printer ID command (1D 49 *n*) when the printer is in A794 emulation mode. The printer can be configured to send back the ID of the A794, A793 or Application Compatible Escape Command systems.

- Default lines per inch

  This function allows you to set the default for lines per inch to:

  - 8.13 lines per inch
  - 7.52 lines per inch
  - 6.00 lines per inch

- Carriage return usage

  This function allows the printer to ignore or use the *carriage return* (hexadecimal 0D) command depending on the application. Some applications expect the command to be ignored while others use the command as a print command.

- Default font

  Sets the default for monochrome and LEGACY emulations.

- Font size

  Allows user to set font size for the emulation being used.

**Select the hardware options sub-menu to set:**

- Printhead setting

  This setting is the printhead energy rating and must match the rating marked on the front right of the thermal mechanism in the printer. Whenever a new thermal mechanism is installed, this setting must match the indicated energy rating on the mechanism. (See A798 Service manual for replacing the thermal mechanism.)

- Print density (monochrome papers only)

  Adjusts printhead energy level to darken printout or adjust for paper variations. When printer prints high-density print lines (text or graphics), it automatically slows down. Factory setting is 100%.

***WARNING:*** *Choose a print density setting no higher than necessary to achieve acceptable print density. Failure to observe this rule may result in a printer service call and may void the printer warranty. Running at a higher energy level will reduce the printhead life. Consult your CognitiveTPG technical support specialist if you have questions.*

- Power supply wattage (Max power)

  You can choose between a 55-watt or 75-watt power supply. This matches the wattage of the printer to the power supply.

  55-watt power supply (standard)

  75-watt power supply (Enables printer to optimize speed at higher dot coverage.)

- Knife option

  This should only be changed if the knife is removed or you do not want to cut the paper.

- Partial cut distance

  Allows the user to set the distance that the knife will cut across a receipt in 5 step increments between 110-160.

- Paper low sensor

  Senses when the paper roll is getting low on paper.

  See troubleshooting section: “Receipt paper is low” in the A798 User Guide.

- Paper width

  Allows the user to set the printer for 58mm, 60mm, 80mm, or 82.5mm paper width.

| For more information about | See this section |
|---|---|
| Setting the printer functions and settings | “Configuring the printer” on page 16 |

# Chapter 3: Programming the Printer

## Overview of commands

Commands control all operations and functions of the printer. This includes selecting the size and placement of characters and graphics on the receipt to feeding and cutting the paper. The programming commands have been organized, in order of hexadecimal code within functional groups. For this reason, "related" commands may not be listed adjacent to one another.

The operation of various printers may be emulated by the commands, including the following:

- A793
- A794
- LEGACY

Any of the commands may be used in any combination to program a host computer to communicate with the printer (unless otherwise noted).

Some commands listed and described here may not be implemented and are identified as "not implemented." If received, they are ignored and not sent to the print buffer as data.

Any nonlegal commands have their parameter sent to the print buffer as data.

## Comparison to A793

The following table details the list of commands whose behavior differs between the A793, A794, and A798 because of the physical differences of a 6 dots/mm head (A793) versus an 8 dots/mm head (A794 and A798).

| Command | Description | Difference between previous product and new product emulation mode. |
|---|---|---|
| 15 n | Feed n dot rows | This command will move the paper on the receipt in n/203 inch steps instead of n/152 inch steps. |
| 16 *n* | Add *n* extra dot rows | The dot rows will be measured in n/203 inches versus n/152 inches. |
| 1B 20 *n* | Set right-side character spacing | This command sets the right side spacing to "n" horizontal motion units. By default, these units are in terms of 1/203 inches versus 1/152 inches. |
| 1B 24 *n1 n2* | Set absolute starting position | For graphics commands, the position is scaled to best match A793. In text mode, the equivalent character position is calculated. |
| 1B 26 *s c1 c2 n1 d1...nn dn*] | Define user-defined character set | Since the dots on the A798 printhead are smaller, user defined characters that were used on the previous printers will appear smaller on the A798 printer. |
| 1B 2A *m n1 n2 d1...dn* | Select bit image mode | In A793 emulation mode, graphics are scaled to best match the size of the graphic in the A793 printer. |
| 1B 33 *n* | Set line spacing | This command uses *n* in terms of n/360 inches. Since the A793 had a fundamental step of 1/152 inch and the A798 has a fundamental step of 1/203 inch, the actual line spacing will not exactly match the requested spacing. |

*Continued...*

| Command | Description | Difference between previous product and new product emulation mode. |
|---|---|---|
| 1B 4A *n* | Print and feed paper | This command uses *n* in terms of n/360 inches. Since the A793 had a fundamental step of 1/152 inch and the A798 has a fundamental step of 1/203 inch, the actual line spacing will not exactly match the requested spacing. |
| 1B 59 *n1 n2 d1...dn* | Select double-density graphics | In A793 emulation mode, the printer scales the graphics to provide the best match. |
| 1B 5C *n1 n2* | Set relative print position | The parameter to this command is in units of dots. However, the command moves and aligns to character positions. In A793 emulation mode, this command calculates how many character positions to move based on the A793 character width in dots (10) versus the A798 (13). |
| 1B 61 *n* | Select justification | This command does true dot resolution alignment for centering versus character-aligned centering. |
| 1D 2A *n1 n2 d1...dn*] | Define downloaded bit image | In A793 emulation mode, this command scales the incoming data to provide a best match to the size of the image as it printed on A793. |
| 1D 2F *m* | Print downloaded bit image | In A793 emulation mode, this command scales the incoming data to provide a best match to the size of the image as it printed on A793. |

# Character appearance

The appearance of text can be changed using the following print modes:

- Standard
- Compressed
- Double-high
- Double-wide
- Upside-down
- Rotated
- Underlined
- Bold
- Reverse
- Italic
- Scaled

## Width specifications

### Standard

- Characters per inch: 15.6
- Characters per line: 44
- Cell size: 13 X 24 dots

### Compressed

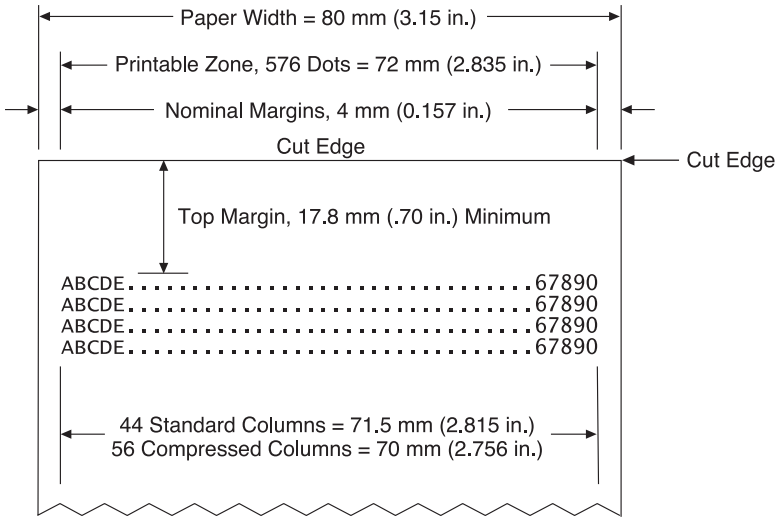
- Characters per inch: 20.3
- Characters per line: 56
- Cell size: 10 X 24 dots

# Print zones

## Print zones for 80mm paper

Specifications of print zone for 80mm paper:

- 576 dots (addressable) @ 8 dots/mm, centered on 80mm
- Standard mode: minimum margins: 2.0mm (.079 inches)
- Top margin to manual tear-off: 17.8mm (0.70 inches)
- Top margin to knife cut: 19.0mm (0.75 inches)


Paper Width = 80 mm (3.15 in.)
Printable Zone, 576 Dots = 72 mm (2.835 in.)
Nominal Margins, 4 mm (0.157 in.)
Cut Edge
Cut Edge
Top Margin, 17.8 mm (.70 in.) Minimum
ABCDE.....67890
ABCDE.....67890
ABCDE.....67890
ABCDE.....67890
44 Standard Columns = 71.5 mm (2.815 in.)
56 Compressed Columns = 70 mm (2.756 in.)

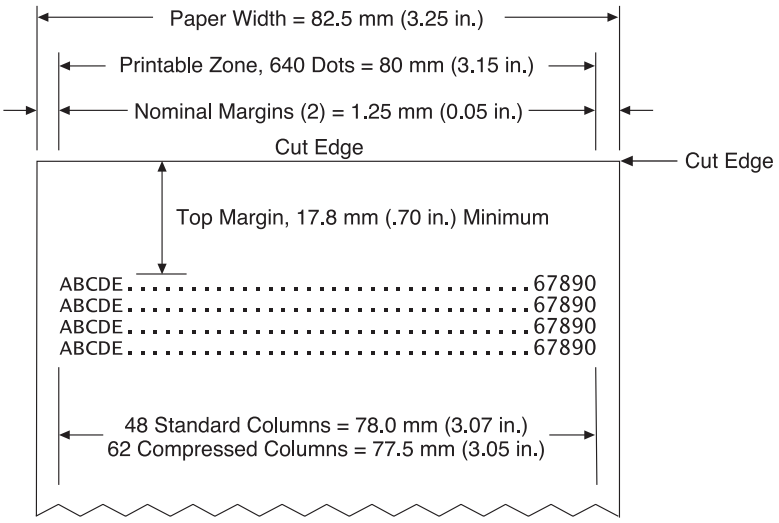
***Note:*** *The application centers 44 standard character cells (13 X 24 dots), or 56 compressed character cells (10 X 24 dots), or 576 addressable bits of graphics across an 80mm wide receipt. Minimum print line height is 24 dots for text or graphics. Standard print line spacing is 27 dots (i.e., 3 extra row dots).*

*The A798 adds a 27 dot high font, so standard print spacing is 30 dots.*

### Print zones for 82.5mm paper

Specifications of print zone for 82.5 mm paper:

- 640 dots (addressable) @ 8 dots/mm, centered on 82.5mm
- Standard mode: minimum margins: 1.0mm (0.040 inches)
- Top margin to manual tear-off: 17.8mm (0.70 inches)
- Top margin to knife cut: 19.0mm (0.75 inches)


Paper Width = 82.5 mm (3.25 in.)
Printable Zone, 640 Dots = 80 mm (3.15 in.)
Nominal Margins (2) = 1.25 mm (0.05 in.)
Cut Edge
Cut Edge
Top Margin, 17.8 mm (.70 in.) Minimum
ABCDE 67890
ABCDE 67890
ABCDE 67890
ABCDE 67890
48 Standard Columns = 78.0 mm (3.07 in.)
62 Compressed Columns = 77.5 mm (3.05 in.)

## Rotated printing commands

Three commands control the rotation of printing. The table shows the combinations of set/cancel upside down print, set/cancel rotated print (clockwise), and rotated print (counterclockwise).

*Rotated clockwise* and *rotated counterclockwise* print commands are mutually exclusive: the setting of the last received command is effective. Unintended consequences may result when *rotated clockwise* is mixed with other commands.

The samples of the print show only the normal-size characters. Double-wide and double-high characters are printed in the same orientation. They may also be mixed on the same line.

| Upside down (1B 7B *n*) | Rotated CW (1B 56 *n*) | Rotated CCW (1B 12) | Resulting output |
|---|---|---|---|
| Canceled | Canceled | Cleared | **A B C** |
| Canceled | Set | X | **A B C** |
| Set | Canceled | X | **C B A** |
| Set | Set | X | **C B A** |
| X | X | Set | **A B C** |

***Note:*** *The following print modes cannot be mixed on the same line:*

- Right-side up and upside-down
- Single-high (normal) and double-high

# Emulation modes

The CognitiveTPG A798 printer may be operated in a number of different emulation modes. However, printing characteristics and defaults may differ, depending on the desired mode.

## Print setup in emulation modes

Refer to the chart below for defaults and allowed printing options in each emulation mode.

| Emulation mode | LPI options | Font(s) options | Font size | Default LPI | Default EDR | Comments |
|---|---|---|---|---|---|---|
| **Native** | 6.00, 6.77, 7.52, 8.13 | Standard | 13X24 | 7.52 | 3 | Default setup for monochrome paper |
| | | Tall | 13X27 | 6.77 | 3 | |
| **A794, A793 emulations** | 6.00, 7.52, 8.13 | Standard | 13X24 | 7.52 | 3 | |
| **LEGACY* emulation** | 6.00 | Tall<br>Standard | 13X27<br>13X24 | 6.00<br>6.00 | 7<br>10 | Default setup for LEGACY emulation |

**The following list clarifies how the A798 printer will behave in each emulation mode:**

- If only the font is changed, the default LPI will automatically be changed as in the table above.
- If emulation is switched from any emulation to A798 native, the font and LPI will remain unchanged because the A798 native mode supports all font and LPI options offered in the emulation modes.
- The “Set Default LPI” option in the configuration menu is not offered in LEGACY emulation made. The LPI is set at 6.00.

# Chapter 4: Programming Commands

## Commands listed by function

### Printer actions


| Code (hexadecimal) | Command | Page |
|---|---|---|
| 10 | Clear printer | 34 |
| 19 | Perform full knife cut (or code 1B 69) | 34 |
| 1A | Perform partial knife cut (or code 1B 6D) | 34 |
| 1B 07 | Generate tone | 35 |
| 1B 3D *n* | Select peripheral device (for multi-drop) | 35 |
| 1B 40 | Initialize printer | 35 |
| 1B 63 33 *n* | Select paper sensors to output paper end signals (parallel only) | 36 |
| 1B 63 34 *n* | Select sensors to stop printing | 36 |
| 1B 63 35 *n* | Enable or disable panel button | 37 |
| 1B 69 | Perform full knife cut (or code 19) | 34 |
| 1B 6D | Perform partial knife cut (or code 1A) | 34 |
| 1B 70 *n p*1 *p*2 | Generate pulse to open cash drawer | 37 |
| 1D 56 *m* | Select cut mode and cut paper (or code 1D 56 *m n*) | 38 |
| 1D 56 *m n* | Select cut mode and cut paper (or code 1D 56 *m*) | 38 |
| 1F 74 | Print test form | 38 |


### Print and paper feed


| Code (hexadecimal) | Command | Page |
|---|---|---|
| 0A | Print and feed paper one line | 39 |
| 0D | Print and carriage return | 39 |
| 14 *n* | Feed *n* print lines | 39 |
| 15 *n* | Feed *n* dot rows | 39 |
| 16 *n* | Add *n* extra dot rows | 40 |
| 17 | Print | 40 |
| 1B 4A *n* | Print and feed paper | 41 |
| 1B 64 *n* | Print and feed *n* lines | 41 |

## Vertical and horizontal positioning


| Code (hexadecimal) | Command | Page |
|---|---|---|
| 09 | Horizontal tab | 42 |
| 1B 14 *n* | Set column | 42 |
| 1B 24 *n*L *n*H | Set absolute starting position | 43 |
| 1B 32 | Set vertical line spacing to 1/6 inch | 43 |
| 1B 33 *n* | Set vertical line spacing | 44 |
| 1B 44 [*n*] *k* 00 | Set horizontal tab positions | 44 |
| 1B 5C *n*1 *n*2 | Set relative print position | 45 |
| 1B 61 *n* | Select justification | 46 |
| 1D 4C *n*L *n*H | Set left margin | 46 |
| 1D 50 *x y* | Set horizontal and vertical minimum motion units | 42 |
| 1D 57 *n*L *n*H | Set printing area width | 47 |


## Text characteristics


| Code (hexadecimal) | Command | Page |
|---|---|---|
| 12 | Select double-wide characters | 48 |
| 13 | Select single-wide characters | 48 |
| 1B 12 | Select 90 degree counter-clockwise rotated print | 48 |
| 1B 16 *n* | Select pitch (column width) | 49 |
| 1B 20 *n* | Set right-side character spacing | 49 |
| 1B 21 *n* | Select print mode | 50 |
| 1B 25 *n* | Select or cancel user-defined character set | 51 |
| 1B 26 *s c1 c2* | Define user-defined character set | 51 |
| 1B 2D *n* | Select or cancel underline mode | 52 |
| 1B 3A 30 30 30 | Copy character set from ROM to RAM | 53 |
| 1B 3F *n* | Cancel user-defined character | 53 |
| 1B 45 *n* | Select or cancel emphasized mode | 53 |
| 1B 47 *n* | Select or cancel double-strike | 54 |
| 1B 49 *n* | Select or cancel italic print | 54 |
| 1B 52 *n* | Select international character code | 55 |
| 1B 56 *n* | Select or cancel 90 degree clockwise rotated print | 55 |
| 1B 74 *n* | Select international character set | 56 |
| 1B 7B *n* | Select or cancel upside-down print mode | 56 |
| 1D 21 *n* | Select character size | 57 |
| 1D 42 *n* | Select or cancel white/black reverse print mode | 58 |
| 1F 05 *n* | Select supersctipt or subscript modes | 59 |
| 1F 26 *s c1 c2* | Define extended user-defined character set | 52 |
| 1F 69 n | Select active user-defined character set | 59 |

## Graphics

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 11 *n1 … n72* | Print raster graphics | 65 |
| 1B (+*.BMP) | Download BMP logo | 59 |
| 1B 2A *m n1 n2 d1…dn* | Select bit image mode | 60 |
| 1B 2E *m n rL rH d1 … dn* | Print advanced raster graphics | 61 |
| 1B 4B *n1 n2 d1…dn* | Select single-density graphics | 61 |
| 1B 59 *n1 n2 d1…dn* | Select double-density graphics | 61 |
| 1C 70 *n m* | Print Flash Logo | 62 |
| 1C 71 *n* | Define Flash Logos | 62 |
| 1D 23 *n* | Select the current logo (downloaded bit image) | 62 |
| 1D 2A *n1 n2 d1…dn* | Define downloaded bit image | 63 |
| 1D 2F *m* | Print downloaded bit image | 64 |
| 1F 04 *n* | Convert 6-dots/mm bitmap to 8 dots/mm bitmap | 64 |

## Status

### Batch mode

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 1B 75 0 | Transmit peripheral device status (RS-232C printers only) | 66 |
| 1B 75 *n* | Request alternate status (A793 emulation only) | 66 |
| 1B 76 | Transmit paper sensor status | 67 |
| 1D 49 *n* | Transmit printer ID | 68 |
| 1D 49 40 *n* | Transmit printer ID, remote diagnostics extension | 69 |
| 1D 72 *n* | Transmit status | 71 |
| 1F 56 | Send printer software version | 72 |

### Real time

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 10 04 *n* | Real time status transmission (DLE sequence) | 74 |
| 10 05 *n* | Real time request to printer (DLE sequence) | 77 |
| 1D 03 *n* | Real time request to printer (GS sequence) | 77 |
| 1D 04 *n* | Real time status transmission (GS sequence) | 74 |
| 1D 05 | Real time printer status transmission | 78 |
| 1F 7A | Real time commands disabled | 78 |

### Unsolicited status mode

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 1D 61 n | Select or cancel unsolicited status mode | 79 |

## Bar codes

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 1D 48 *n* | Select printing position for HRI characters | 83 |
| 1D 66 *n* | Select pitch for HRI characters | 83 |
| 1D 68 *n* | Select bar code height | 83 |
| 1D 6B *m d1…dk* 00<br>or<br>1D 6B *m n d1…dn* | Print bar code | 84 |
| 1D 6B FF *n* | Print Multiple Barcodes | 85 |
| 1D 6B *n* d1... 00 | Print GS1 Databar (formerly RSS), null terminated | 87 |
| 1D 6B *m n* L *n* H d1... dn | Print GS1 Databar (formerly RSS), data length specified | 87 |
| 1D 70 *a b c d e f* | Select PDF 417 parameters | 88 |
| 1D 71 *a b c d e f* L *f* H | Set GSI Databar (formerly RSS) parameters | 86 |
| 1D 77 *n* | Select bar code width | 89 |

## Page mode

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 0C | Print and return to standard mode | 90 |
| 18 | Cancel print data in page mode | 90 |
| 1B 0C | Print data in page mode | 90 |
| 1B 4C | Select page mode | 91 |
| 1B 53 | Select standard mode | 92 |
| 1B 54 *n* | Select print direction in page mode | 92 |
| 1B 57 *n1, n2…n8* | Set print area in page mode | 93 |
| 1D 24 *n*L *n*H | Set absolute vertical print position in page mode | 94 |
| 1D 5C *n*L *n*H | Set relative vertical print position in page mode | 94 |

## Macros

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 1D 3A | Select or cancel macro definition | 95 |
| 1D 5E r t m | Execute macro | 95 |

## User data storage

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 1B 27 *m a0 a1 a2 d1…dm* | Write to user data storage | 96 |
| 1B 34 *m a0 a1 a2* | Read from user data storage | 96 |
| 1B 6A *k* | Read from non-volatile memory (NVRAM) | 96 |
| 1B 73 *n1 n2 k* | Write to non-volatile memory (NVRAM) | 96 |
| 1D 22 *n* | Select memory type (SRAM/flash) where to save logos or user-defined fonts | 97 |
| 1D 22 55 *n1 n2* | Flash memory user sectors allocation | 97 |
| 1D 22 80 | Expanded flash memory allocation | 98 |
| 1D 22 81 *n* | Select flash area for storing logos and fonts | 98 |
| 1D 40 *n* | Erase user flash sector | 99 |

**Flash download**

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 1B 5B 7D | Switch to flash download mode | 100 |
| 1D 00 | Return boot sector firmware part number | 100 |
| 1D 01 | Return segment number status of flash memory | 101 |
| 1D 02 *nn* | Select flash memory sector to download | 101 |
| 1D 06 | Get firmware CRC | 101 |
| 1D 07 | Return microprocessor CRC | 101 |
| 1D 0E | Erase all flash contents except boot sector | 101 |
| 1D 0F | Return main program flash CRC | 102 |
| 1D 10 *n* | Erase selected flash sector | 102 |
| 1D 11 *a*L *a*H *c*L *c*H *d1…dn* | Download to active flash sector | 102 |
| 1D FF | Reset firmware | 102 |

# Command conventions

The following information describes how each command is organized:

**Name:** Name of command.

**ASCII:** The ASCII control code.

**Hexadecimal:** The hexadecimal control code.

**Decimal:** The decimal control code.

**Value:** A description of the command operands.

**Range:** The upper and lower limits of the command operand.

**Default:** The command operand default after printer reset.

**Description:** Brief description and summary of the command.

**Formulas:** Any formulas used for this command.

**Exceptions:** Describes any exceptions to this command; for example, incompatible commands.

**Related information:** Describes related information for this command; for example, bit information.

# Command descriptions

## Printer actions

The printer function commands control the following basic printer functions and are described in order of their hexadecimal codes:

- Resetting the printer
- Cutting the paper
- Opening the cash drawers

### Clear printer

| | |
|---|---|
| **ASCII** | DLE |
| **Hexadecimal** | 10 |
| **Decimal** | 16 |

Clears the print line buffer without printing and sets the printer to the following condition:

- Double-wide command (0x12) is canceled
- Line spacing, pitch, and user-defined character sets are maintained at current selections (RAM is not affected)
- Single-wide, single-high, non-rotated, and left-aligned characters are set
- Printing position is set to column one

**Related Information**

This command is recognized in A793 emulation and A798 native mode, ignored in LEGACY emulation.

### Perform full knife cut

| | | |
|---|---|---|
| **ASCII** | EM | ESC i |
| **Hexadecimal** | 19 | 1B 69 |
| **Decimal** | 25 | 27 105 |

Cuts the receipt.

There are two codes (Hex 19 or 1B 69) for this command and both perform the same function. See also 1D 56.

**Exceptions**

The full cut is replaced by a partial cut in the A793 emulation. ASCII EM, (0x19) is ignored in LEGACY emulation.

### Perform partial knife cut

| | | |
|---|---|---|
| **ASCII** | SUB | ESC m |
| **Hexadecimal** | 1A | 1B 6D |
| **Decimal** | 26 | 27 109 |

Partially cuts the receipt. The default setting leaves 5mm (0.20 inch) of paper on the left edge. (See setting partial cut distance in diagnostics.)

There are two codes (Hex 1A or 1B 6D) for this command and both codes perform the same function. See also 1D 56.

**Formulas**

The cut edge is 144 dot rows or 18 mm (0.71 inch) above the print station.

**Exceptions**

The command is valid only at the beginning of a line. ASCII SUB, (0x1A), is ignored in LEGACY emulation. Line feed is executed first, if the buffer is not empty.

### Generate tone

**ASCII** ESC BEL
**Hexadecimal** 1B 07
**Decimal** 27 7

Generates an audible tone. Performed by the printer to signal certain conditions.

**Related information**

This command is ignored in LEGACY emulation.

### Select peripheral device (for multi-drop)

**ASCII** ESC = *n*
**Hexadecimal** 1B 3D *n*
**Decimal** 27 61 *n*

**Value of *n*:** 0 (bit 0), device not selected
1 (bit 0), device selected

**Default:** 1 (bit 0), device selected

Selects the device to which the host computer sends data.

**Related information**

Other bits of *n* (1–7) are undefined and ignored.

When the printer is disabled by this command, it ignores transmitted data until the printer is re-enabled by the same command.

### Initialize printer

**ASCII** ESC @
**Hexadecimal** 1B 40
**Decimal** 27 64

**Default:**

| | |
|---|---|
| Character pitch: | 15.6 CPI |
| Column width: | 44 characters |
| Extra dot rows: | 3 |
| Character set: | Code Page 437 |
| Printing position: | Column One |

Clears the print line buffer and resets the printer to the default settings for the start-up configuration (refer to Default settings above).

Single-wide, single-high, non-rotated, and left-aligned characters are set, and user-defined characters or logo graphics are cleared. (Flash memory is not affected.) Tabs reset to default. Receipt selection state is selected.

## Select paper sensors to output paper-end signals

**ASCII** ESC c 3 *n*
**Hexadecimal** 1B 63 33 *n*
**Decimal** 27 99 51 *n*

**Value of *n*:**

If either bit 0 or bit 1 is on, the paper roll near-end sensor is selected as the paper sensor outputting paper-end signals.

If either bit 2 or bit 3 is on, the paper roll-end sensor is selected as the paper sensor outputting paper-end signals.

| Bit | Position | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Paper roll near-end sensor disabled |
| | On | 01 | 1 | Paper roll near-end sensor enabled |
| 1 | Off | 00 | 0 | Paper roll near-end sensor disabled |
| | On | 02 | 2 | Paper roll near-end sensor enabled |
| 2 | Off | 00 | 0 | Paper roll-end sensor disabled |
| | On | 04 | 4 | Paper roll-end sensor enabled |
| 3 | Off | 00 | 0 | Paper roll-end sensor disabled |
| | On | 08 | 8 | Paper roll-end sensor enabled |
| 4, 5, 6, 7 | – | – | – | Undefined |

**Range of *n*:** 1–255

**Default of *n*:** 12

Specifies the paper sensor to output a paper-end signal. Multiple sensors may be selected to signal when paper has run out. When multiple sensors have been selected, anytime one of the sensors detects a paper-end, the paper end signal is output.

When this command is executed a sensor is switched. The paper-end signal switching is delayed depending on the receive buffer state.

**Exceptions**

The command is ignored, except in parallel communications.

## Select sensors to stop printing

**ASCII** ESC c 4 *n*
**Hexadecimal** 1B 63 34 *n*
**Decimal** 27 99 52 *n*

**Value of *n*:** Sensor status

| | | Sensor Status | |
|---|---|---|---|
| **Bit** | **Sensor** | **0** | **1** |
| 0 | Receipt paper near-end | Disabled | Enabled |
| 1 | Receipt paper near-end | Disabled | Enabled |
| 2–4 | Undefined | | |
| 6 | Undefined | | |

Bits 5 and 7 are not used.

**Default**: 0

Determines which sensor stops printing on the respective station. The command does not affect the paper out status on the receipt station, which will automatically stop the printer when the paper is depleted.

## Enable or disable panel button

**ASCII** ESC c 5 *n*
**Hexadecimal** 1B 63 35 *n*
**Decimal** 27 99 53 *n*

**Value of *n:*** 0 = Enable
1 = Disable

**Default:** 0 (Enable)

Enables or disables the paper feed button. If the last bit is 0, the paper feed button is enabled. If the last bit is 1, the paper feed button is disabled.

### Exceptions

Functions that require the paper feed button (except for the execute macro [1D 5E] command) cannot be used when it has been disabled with this command.

## Generate pulse to open cash drawer

**ASCII** ESC p *n p*1 *p*2
**Hexadecimal** 1B 70 *n p*1 *p*2
**Decimal** 27 112 *n p*1 *p*2

**Value of *n:*** 00, 48 (Decimal) = Drawer 1;
01, 49 (Decimal) = Drawer 2

**Value of *p1:*** 0–255

**Value of *p2:*** 0–255

Sends a pulse to open the cash drawer.

### Formulas

The value for either *p1* or *p2* is the hexadecimal number multiplied by 2 msec to equal the total time.

- On-time = *p1* (Hex) x 2 msec
- Off-time = *p*2 (Hex) x 2 msec

### Related information

Off-time is the delay before the printer performs the next operation. Refer to cash drawer specifications for required on and off-time.

## Select cut mode and cut paper

| | | |
|---|---|---|
| **ASCII** | GS V *m* | GS V *m n* |
| **Hexadecimal** | 1D 56 *m* | 1D 56 *m n* |
| **Decimal** | 29 86 *m* | 29 86 *m n* |

**Value of *m:*** Selects the mode as shown in the table.

**Value of *n:*** Determines cutting position only if *m* is 65 or 66.

| ***m*** | **Feed and cut mode** |
|---|---|
| 0, 48 | Full cut (no extra feed) |
| 1, 49 | Partial cut (no extra feed) |
| 65 | Feeds paper to cutting position + (*n* times vertical motion unit), and cuts the paper completely |
| 66 | Feeds paper to cutting position + (*n* times vertical motion unit), and performs a partial cut |

**Range of *m:*** 0, 48; 1, 49
65, 66 (when used with *n*)

**Range of *n:*** 0 – 255

**Default of *m, n:*** 0

Selects a mode for cutting paper and cuts the paper. There are two formats for this command, one requiring one parameter *m*, the other requiring two parameters *m* and *n*. The format is indicated by the parameter *m*.

**Formulas**

*n* times the vertical motion unit is used to determine the cutting position to which the paper is fed.

## Print test form

| | |
|---|---|
| **ASCII** | US t |
| **Hexadecimal** | 1F 74 |
| **Decimal** | 31 116 |

Prints the current printer configuration settings on the receipt.

Disabled in page mode.

## Print and paper feed

The print and feed commands control printing on the receipt and paper feed by the printer.

### Print and feed paper one line

**ASCII** LF
**Hexadecimal** 0A
**Decimal** 10

Prints one line from the buffer and feeds paper one line.

Carriage return/line feed pair prints and feeds only one line.

### Print and carriage return

**ASCII** CR
**Hexadecimal** 0D
**Decimal** 13

Prints one line from the buffer and feeds paper one line. The printer can be set through the configuration menu to ignore or use this command. Some applications expect the command to be ignored while others use it as print command.

**Related information**

See ignoring/using the carriage return in *Diagnostics* for more information.

This command is ignored in LEGACY emulation.

Carriage return/line feed pair prints and feeds only one line.

### Feed *n* print lines

**ASCII** DC4 *n*
**Hexadecimal** 14 *n*
**Decimal** 20 *n*

**Value of *n*:** The number of lines to feed at current line height setting.

**Range of *n*:** 0–255 in A798 native mode
0–127 in A793 emulation

Feeds the paper *n* lines at the current line height without printing. Ignored on receipt if current line is not empty.

**Related information**

This is ignored in LEGACY emulation and the parameter byte goes into the print buffer.

### Feed *n* dot rows

**ASCII** NAK *n*
**Hexadecimal** 15 *n*
**Decimal** 21 *n*

**Value of *n*:** *n*/203 inch

**Range of *n*:** 0–255 in A798 native mode
0–127 in A793 emulation

Feeds the paper *n* dot rows (*n*/8 mm, *n*/203 inch), without printing. Receipt moves *n* rows if the print buffer is empty.

**Related information**

This is ignored in LEGACY emulation and the parameter byte goes into the print buffer.

## Add *n* extra dot rows

**ASCII** SYN *n*
**Hexadecimal** 16 *n*
**Decimal** 22 *n*

**Value of *n*:** Number of extra dot rows

**Range of *n*:** 0–16

**Default:** 3 extra dot rows

Adds *n* extra dot rows (*n*/8 mm, *n*/203 inch) to the character height to increase space between print lines or decrease the number of lines per inch.

### Formulas

The following table shows the relationship between the number of lines per inch and each extra dot row added:

| Extra rows | Lines per inch | Dot rows |
|---|---|---|
| 0 | 8.5 | 24 |
| 1 | 8.1 | 25 |
| 2 | 7.8 | 26 |
| 3 | 7.5 | 27 |
| 4 | 7.2 | 28 |
| 5 | 7.0 | 29 |
| 6 | 6.77 | 30 |
| 7 | 6.5 | 31 |
| 8 | 6.3 | 32 |
| 9 | 6.1 | 33 |
| 10 | 6.0 | 34 |
| 11 | 5.8 | 35 |
| 12 | 5.6 | 36 |
| 13 | 5.5 | 37 |
| 14 | 5.3 | 38 |
| 15 | 5.2 | 39 |
| 16 | 5.1 | 40 |

### Related information

This is ignored in LEGACY emulation and the parameter byte goes into the print buffer.

## Print

**ASCII** ETB
**Hexadecimal** 17
**Decimal** 23

Prints one line from the buffer and feeds paper one line. Executes LF on receipt.

### Related information

This command is ignored in LEGACY emulation.

## Print and feed paper

**ASCII** ESC J *n*
**Hexadecimal** 1B 4A *n*
**Decimal** 27 74 *n*

**Value of *n:*** *n*/203 inch in A798 native mode, A794 emulation and Application Compatible Escape Commands emulation mode; *n*/360 inch in A793 emulation mode

**Range of *n:*** 0–255

Prints one line from the buffer and feeds the paper *n*/8 mm (*n*/203 inch). The line height equals the character height when *n* is too small.

If the set horizontal and vertical minimum motion units command (1D 50) is used to change the horizontal and vertical minimum motion units, the parameters of this command (print and feed paper) will be interpreted accordingly.

**Related information**

For more information, see the description of the set horizontal and vertical minimum motion units command in this document.

## Print and feed *n* lines

**ASCII** ESC d *n*
**Hexadecimal** 1B 64 *n*
**Decimal** 27 100 *n*

**Range of *n:*** 1–255 (0 is interpreted as 1)

Prints one line from the buffer and feeds paper *n* lines at the current line height.

## Vertical and horizontal positioning

The horizontal positioning commands control the horizontal print positions of characters on the receipt.

The commands describe operation for 80mm paper. If the printer supports 82.5mm paper, the dot spacing is the same but there are 640 printable dots rather than 576 printable dots on the 80mm paper.

### Horizontal tab

**ASCII** HT
**Hexadecimal** 09
**Decimal** 9

Moves the print position to the next tab position set by the set horizontal tab positions (1B 44 *n*1 *n*2 ... 00) command. The print position is reset to column one after each line.

Tab treats the left margin as column one, therefore changes to the left margin will move the tab positions.

When no tabs are defined to the right of the current position, or if the next tab is past the right margin, line feed is executed. HT has no effect in page mode.

Print initialization sets 32 tabs at column 9, 17, 25…

### Set horizontal and vertical minimum motion units

**ASCII** GS P *x y*
**Hexadecimal** 1D 50 *x y*
**Decimal** 29 80 *x y*

**Value of *x*:** Horizontal

**Value of *y*:** Vertical

**Range of *x*:** 0 – 255

**Range of *y*:** 0 – 255

**Default of *x*:** 203

**Default of *y*:** 203

Sets the horizontal and vertical motion units to 1/*x* inch and 1/*y* inch respectively.

When *x* or *y* is set to 0, the default setting for that motion unit is used.

### Set column

**ASCII** ESC DC4 *n*
**Hexadecimal** 1B 14 *n*
**Decimal** 27 20 *n*

**Value of *n*:** 1 – 44 = Standard pitch
1 – 56 = Compressed pitch

**Default of *n*:** 1

Prints the first character of the next print line in column *n*. It must be sent for each line not printed at column one. The value of *n* is set to one after each line.

#### Exceptions

This command cannot be used with single- or double-density graphics.

#### Related information

This is ignored in LEGACY emulation and the parameter byte goes into the print buffer.

## Set absolute starting position

**ASCII** ESC $ *n*L *n*H
**Hexadecimal** 1B 24 *n*L *n*H
**Decimal** 27 36 *n*L *n*H

**Value of *n:*** *n* = Number of dots to be moved from the beginning of the line.
*n*L = Remainder after dividing *n* by 256.
*n*H = Integer after dividing *n* by 256.

The values for *n*L and *n*H are two bytes in low byte, high byte word orientation.

Sets the print starting position to the specified number of dots (up to the right margin) from the beginning of the line. The print starting position is reset to the first column after each line.

**Formulas**

The example shows how to calculate 280 dots as the absolute starting position.

28 x 10 = 280 dots (beginning of column 29)
280/256 = 1, remainder of 24
*n*L = 24 *n*H = 1

**Related information**

If the set horizontal and vertical motion units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of the set relative print position command will be interpreted accordingly. For more information, see the description of the command set horizontal and vertical minimum motion units command (1D 50) in this document.

**Compatibility information (A798 receipt vs. A793 receipt)**

There is a difference in the normal behavior of this command in A793 emulation mode as compared to the original A793. The difference exists when the command is used to move to the left. The A793 processes the whole print string prior to putting it in the buffer for the print head. This method of processing allows the A793 to backup in the print string and replace characters and their associated attributes when a “Set relative print position” command instructs the printer to move the print position to the left.

In order to improve the speed of printing, the A798 moves the data into a buffer for the printhead when it receives it. When the “Set relative print position” command contains a move to the left, this causes the new data to overstrike the previous data. This behavior can be used to an application’s advantage to provide the ability to create compound characters on the receipt station.

This command also functions differently in the A793 emulation when used in graphics:

n x 2 = Number of dots to be moved from the beginning of the line when this command is followed by a graphics command.

## Set vertical line spacing to 1/6 inch

**ASCII** ESC 2
**Hexadecimal** 1B 32
**Decimal** 27 50

**Default:** 3.33 mm (0.13 inch)

Sets the default line spacing to 4.25 mm (1/6 of an inch).

## Set vertical line spacing

**ASCII** ESC 3 *n*
**Hexadecimal** 1B 33 *n*
**Decimal** 27 51 *n*

**Value of *n:*** *n*/406 inch in A798 native mode, A794 emulation
*n*/360 inch in A793 emulation mode
n/203 inch in Application Compatible Escape Commands emulation mode

**Range of *n:*** 0-255

**Default:** 3.37 mm (0.13 inch)

Sets the line spacing to *n*/16 mm (*n*/406 inch).

The minimum line spacing is 8.5 lines per inch. The line spacing equals the character height when *n* is too small.

If the set horizontal and vertical minimum motion units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of this command (set line spacing) will be interpreted accordingly.

**Related information**

For more information, see the description of the set horizontal and vertical minimum motion units command in this document.

## Set horizontal tab positions

**ASCII** ESC D [*n*]…*k* NUL
**Hexadecimal** 1B 44 [*n*]…*k* 00
**Decimal** 27 68 [*n*]…*k* 0

**Value of *n:*** Column number for tab minus one (*n* is always less than or equal to the current selected column width)

**Value of *k:*** 0-32 (decimal)

**Default:** Every 8 characters from column 1 (9, 17, 25, etc.) for normal print.

Sets up to 32 horizontal tab positions *n* columns from column one, but does not move the print position. See the horizontal tab command (09).

The tab positions remain unchanged if the character widths are changed after the tabs are set. The command ends with hexadecimal 00; hexadecimal 1B 44 00 clears all tabs.

Tabs assumed to be in strictly ascending order. A tab out of order terminates the command string as if it were 00, and remaining tab values are taken as normal data.

**Formulas**

Set the tab positions in ascending order and put Hex 00 at the end. Hex 1B 44 00 (number of tabs not specified) clears all tab positions.

**Exceptions**

The tabs cannot be set higher than the column width of the current pitch:

Standard pitch = 44 columns
Compressed pitch = 56 columns

## Set relative print position

**ASCII** ESC \ *n1 n2*
**Hexadecimal** 1B 5C *n1 n2*
**Decimal** 27 92 *n1 n2*

**Value of *n:***

To move the relative starting position right of the current position:

*n* = Number of dots to be moved right of the current position
*n1* = Remainder after dividing *n* by 256
*n2* = Integer after dividing *n* by 256

The values for *n1* and *n2* are two bytes in low byte, high byte word orientation.

To move the relative starting position left of the current position:

*n* = Number of dots to be moved left of the current position
*n1* = Remainder after dividing (65,536-*n*) by 256
*n2* = Integer after dividing (65,536-*n*) by 256

The values for *n1* and *n2* are two bytes in low byte, high byte word orientation.

Moves the print starting position the specified number of dots either right (up to the right margin) or left (up to the left margin) of the current position. The print starting position is reset to the first column after each line.

Formulas

*To move to the left:*

Determine the value of *n* by multiplying the number of columns to move left of the current position by 10 (standard) or 8 (compressed) pitch. The example shows how to set the relative position two columns in standard pitch (10 dots per column) to the left of the current position.

2 x 10 = 20 dots (two columns to be moved left of the current position)
65,536–20 = 65516
65,516/256 = 255, remainder of 236
*n1* = 236, *n2* = 255

*To move to the right:*

Determine the value of *n* by multiplying the number of columns to move right of the current position by 10 (standard) or 8 (compressed) pitch. The example shows how to set the relative position two columns in standard pitch (10 dots per column) to the right of the current position.

2 x 10 = 20 dots (two columns to be moved left of the current position)
20/256 = 0, remainder of 20
*n1* = 20, *n*2 = 0

**Related information**

If the set horizontal and vertical minimum motion units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of this command (set relative print position) will be interpreted accordingly. For more information, see the description of the set horizontal and vertical minimum motion units command (1D 50) in this document.

**Compatibility information (A798 receipt vs. A793 receipt)**

There is a difference in the normal behavior of this command in A793 emulation mode as compared to the original A793. The difference exists when the command is used to move to the left. The A793 processes the whole print string prior to putting it in the buffer for the print head. This method of processing allows the A793 to backup in the print string and replace characters and their associated attributes when a “Set relative print position” command instructs the printer to move the print position to the left.

*Continued...*

In order to improve the speed of printing, the A798 moves the data into a buffer for the printhead when it receives it. When the "Set relative print position" command contains a move to the left, this causes the new data to overstrike the previous data. This behavior can be used to an application's advantage to provide the ability to create compound characters on the receipt station.

This command also functions differently in the A793 emulation when used in graphics:

n x 2 = Number of dots to be moved from the beginning of the line when this command is followed by a graphic command.

### Select justification

**ASCII** ESC a *n*
**Hexadecimal** 1B 61 *n*
**Decimal** 27 97 *n*

**Value of *n*:** 0, 48 = Left aligned
1, 49 = Center aligned
2, 50 = Right aligned

**Range of *n*:** 0–2, 48–50

**Default:** 0 (Left aligned)

Specifies the alignment of characters, graphics, logos, and bar codes on the receipt station according to the above table.

**Related information**

On the LEGACY emulation printer, this command is valid only at the beginning of a line.

Range of *n* on A793 is 0–255 using low 2 bits only:

| | |
|---|---|
| 00 | left aligned |
| 01 | center |
| 10 | right aligned |
| 11 | center |

### Set left margin

**ASCII** GS L *nL nH*
**Hexadecimal** 1D 4C *nL nH*
**Decimal** 29 76 *nL nH*

**Range of *nL*:** 0–255

**Range of *nH*:** 0–255

**Default:** 576 dots (the maximum printable area)

**Formulas**

Sets the left margin of the printing area. The left margin is set to ((*nH* X 256) + *nL*) times horizontal motion unit) inches. The horizontal motion units are set by the set horizontal and vertical minimum motion units command (1D 50), described in this manual.

The width of the printing area is set by the set printing area width command (1D 57), which follows this command. See the set printing area width command in this document for a description of that command.

If the setting exceeds the printable area, the maximum value of the printable area is used. The maximum printable area is 576 dots. See the illustration.

To set the left margin to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

GS L 203 0

Or, to set the left margin to two inches at the default horizontal motion unit of 1/203 units per inch, send the four-byte string:

GS L 150 1

Where 2 inches = 406/203, and 406 = (1 X 256) + 150.

*Continued...*

**Exceptions:**

The command is effective only at the beginning of a line. This command is ignored if the line buffer is not empty.

---

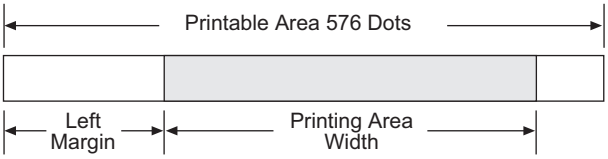
## Set printing area width

**ASCII** GS W *nL nH*
**Hexadecimal** 1D 57 *nL nH*
**Decimal** 29 87 *nL nH*

**Range of *nL:*** 0–255

**Range of *nH:*** 0–255

**Default:** 576 dots (the maximum printable area)




Sets the width of the printing area. If the setting exceeds the printable area, the maximum value of the printable area is used. The width of the printing area is set to ((*nH* X 256) + *nL*) times horizontal motion unit) inches. The horizontal motion units are set by the set horizontal and vertical minimum motion units command (1D 50).

The width of the printing area follows the set left margin command (1D 4C). See the set left margin command (10 4C …) earlier in this document for a description.

**Formulas**

To set the width of the printing area to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

GS W 203 0

Or, to set the width of the printing area to two inches at the default horizontal motion unit of 1/203 units per inch, send the four-byte string:

GS W 150 1

Where 2 inches = 406/203, and 406 = (1 X 256) + 150.

**Exceptions**

This command is effective only at the beginning of a line.

If the setting exceeds the printable area, the maximum value of the printable area is used. The maximum printable area is 576 dots. See the illustration.

## Text characteristics commands

These commands control what the printed information looks like, selection of character sets, definition of custom-defined characters, and setting of margins. The commands are described in order of their hexadecimal codes.

The commands describe operation for 80mm paper. If the printer supports 82.5mm paper, the dot spacing is the same but there are 640 printable dots rather than 576 printable dots on 80mm paper.

### Select double-wide characters

**ASCII** DC2
**Hexadecimal** 12
**Decimal** 18

Prints double-wide characters. The printer is reset to single-wide mode after a line has been printed or the clear printer (0x10) command is received. Double-wide characters may be used in the same line with single-wide characters.

**Exceptions**

Double-wide characters may not be used in the same line with single or double-density graphics.

**Related information**

This command is ignored in LEGACY emulation.

### Select single-wide characters

**ASCII** DC3
**Hexadecimal** 13
**Decimal** 19

Prints single-wide characters. Single-wide characters may be used in the same line with double-wide characters.

**Exceptions**

Single-wide characters may not be used in the same line with single or double-density graphics.

**Related information**

This command is ignored in LEGACY emulation.

### Select 90 degree counter-clockwise rotated print

**ASCII** ESC DC2
**Hexadecimal** 1B 12
**Decimal** 27 18

Rotates characters 90 degrees counter-clockwise. The command remains in effect until the printer is reset or until a clear printer (0x10), select or cancel upside down print (1b 7b) or cancel rotated print (1b 56) command is received.

**Exceptions**

This command is valid only at the beginning of a line.

Rotated print and non-rotated print characters cannot be used together in the same line.

**Related information**

See “Summary of rotated printing” in this document.

This command is ignored in LEGACY emulation.

## Select pitch (column width)

**ASCII** ESC SYN *n*
**Hexadecimal** 1B 16 *n*
**Decimal** 27 22 *n*

**Value of *n*:** 0 = Standard pitch
1 = Compressed pitch

**Default:** 0 (Standard pitch)

Selects the character pitch for a print line.

**Formulas**

The following table provides the print characteristics for both pitches on the receipt station.

| Pitch | Columns, 80mm Paper | Columns, 82.5mm Paper | CPI |
|---|---|---|---|
| Standard | 44 | 49 | 15.6 |
| Compressed | 56 | 64 | 20.3 |

**Related information**

Look in Chapter 3: Programming the Printer, "Character appearance" for a description of both pitches.

This command and the select print modes command (1B 21 *n*) affect pitch selection.

This is ignored in LEGACY emulation and the parameter byte goes into the print buffer.

## Set right-side character spacing

**ASCII** ESC SP *n*
**Hexadecimal** 1B 20 *n*
**Decimal** 27 32 *n*

**Range of *n*:** 0 – 32 (decimal)

**Default:** 0

The units of horizontal and vertical motion are specified by the set horizontal and vertical minimum motion units (1D 50 …) command. Changes in the horizontal or vertical units do not affect the current right side character spacing. When the horizontal or vertical motion unit is changed by the set horizontal and vertical minimum motion units (1D 50 …) command the value must be in even units and not less than the minimum amount of horizontal movement.

In standard mode the horizontal motion unit is used.

In page mode the horizontal or vertical motion unit differs and depends on the starting position of the printable area. When the starting printing position is the upper left or lower right of the printable area (set by select print direction in page mode, 1B 54 *n*) the horizontal motion unit (*x*) is used. When the starting printing position is the upper right or lower left of the printable area (set by select print direction in page mode, 1B 54 *n*) the vertical motion unit (*y*) is used.

**Related information**

This is ignored in LEGACY emulation and the parameter byte goes into the print buffer. In the A793 emulation, the command and parameter byte are ignored.

## Select print mode

**ASCII** ESC ! *n*
**Hexadecimal** 1B 21 *n*
**Decimal** 27 33 *n*

**Value of *n:*** Pitch selection (standard, compressed, double high, or double wide.)

| **Value of *n*** | | | |
|---|---|---|---|
| **Bit[1]** | **Function** | **0** | **1** |
| Bit 0 | Pitch[2] (See chart below) | Standard pitch | Compressed pitch |
| Bit 3 | Emphasized mode | Canceled | Set |
| Bit 4 | Double-high | Canceled | Set |
| Bit 5 | Double-wide | Canceled | Set |
| Bit 7 | Underlined mode | Canceled | Set |

[1]Bits 1, 2 and 6 are not used.

[2]Standard and compressed pitch cannot be used together in the same line.

**Default:** 0 (for bits 0, 3, 4, 5, 7)

This command and select pitch (column width) command (1B 16 *n*) affect pitch selection.

| **Pitch** | **Columns, 80 mm paper** | **Columns, 82.5 mm paper** | **CPI** |
|---|---|---|---|
| Standard | 44 | 49 | 15.6 |
| Compressed | 56 | 64 | 20.3 |

Selects the print mode: standard, compressed, emphasized, underlined, double-high, or double-wide.

**Exceptions**

Refer to the table in other column for exceptions.

**Related information**

Look in Chapter 3: Programming the Printer, “Character appearance” for a description of standard and compressed character pitches.

The bits in this command perform the same function as the stand-alone functions:

| | |
|---|---|
| 1B 16 *n* | Select pitch |
| 1B 45 *n* | Emphasized |
| 1B 47 *n* | Double-strike |
| 12 | Double-wide |
| 13 | Single-wide |
| 1B 2D *n* | Underline |

## Select or cancel user-defined character set

**ASCII** ESC % *n*
**Hexadecimal** 1B 25 *n*
**Decimal** 27 37 *n*

**Value of *n:*** 0 = Code Page 437
1 = User Defined (RAM)
2 = Code Page 850

**Range of *n:*** 0–2

**Default:** 0 (Code Page 437)

Selects the character set. When an undefined RAM character is selected, the current active ROM code page character is used. Look in Chapter 3: Programming the Printer, "Character appearance" for the character sets.

**Exception:**

The character sets cannot be used together on the same line.

**Related information**

In LEGACY emulation, the low order bit of *n* is used to select the user-defined character set and the current active ROM code page is not affected.

## Define user-defined character set

**ASCII** ESC & *s c1 c2 [character 1 data] ... [character k data]*
**Hexadecimal** 1B 26 *s c1 c2 [character 1 data] ... [character k data]*
**Decimal** 27 38 *s c1 c2 [character 1 data] ... [character k data]*

**Values and ranges:**

*s* = 3, the number of bytes (vertically) in the character cell

*c* = the ASCII codes of the first (*c*1) and last (*c*2) characters respectively

*c*1 = Hex 20–FF (20 is always printed as a space)
*c*2 = Hex 20–FF (20 is always printed as a space)

To define only one character, use the same code for both *c*1 and *c*2

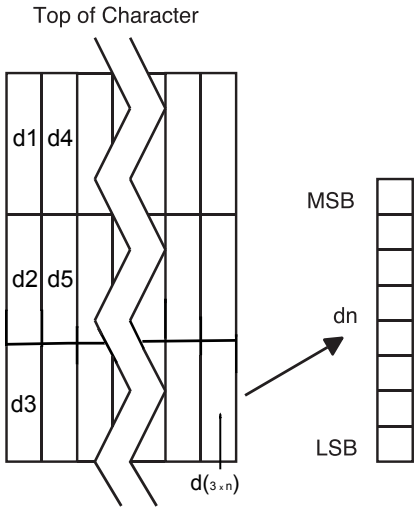
*k* = *c2 – c1 + 1* = the number of characters to be defined in this command string
*[character i data]* = *[ni d1 ... d(3 x ni)]* for *1 ≤ i ≤ k*

*ni* = the number of dot columns for the ith character, *1 ≤ ni ≤ 16*

*d* = the dot data for the characters

The number of bytes for the ith character cell is *3 x ni.*

The bytes are printed down and across each cell.




Defines and enters downloaded characters into RAM. The command may be used to overwrite single characters. User-defined characters are available until power is turned off or the initialize printer command (1B 40) is received.

Any invalid byte (*s*, *c*1, *c*2, *n*1) aborts the command.

**Related information**

See 1D 22 *n* (select memory type) to save user-defined characters.

## Define extended user-defined character set

**ASCII** US & *s c1 c2 [character 1 data] ... [character k data]*
**Hexadecimal** 1F 26 *s c1 c2 [character 1 data] ... [character k data]*
**Decimal** 31 38 *s c1 c2 [character 1 data] ... [character k data]*

**Values and ranges:**

*s* = the number of dot rows in the character cell (maximum 64)

*c* = the ASCII codes of the first (*c*1) and last (*c*2) characters respectively

*c*1 = Hex 20–FF (20 is always printed as a space)
*c*2 = Hex 20–FF (20 is always printed as a space)

To define only one character, use the same code for both *c*1 and *c*2

*j = s/8* = the number of bytes (vertically) in the character cell

*k = c2 – c1 + 1* = the number of characters to be defined in this command string
*[character i data] = [ni d1 ... d(j x ni)]* for *1 ≤ i ≤ k*

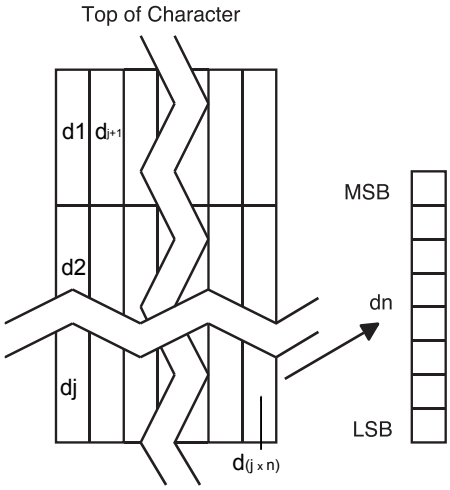
*ni* = the number of dot columns for the ith character, *1 ≤ ni ≤ 16*

*d* = the dot data for the characters

The number of bytes for the ith character cell is *j x ni.*

The bytes are printed down and across each cell.

See the illustration.




Defines and enters downloaded characters into RAM. The command may be used to overwrite single characters. User-defined characters are available until power is turned off or the Initialize Printer command (1B 40) is received.

Any invalid byte (*s*, *c*1, *c*2, *n*1, *n*2) aborts the command.

## Select or cancel underline mode

**ASCII** ESC - *n*
**Hexadecimal** 1B 2D *n*
**Decimal** 27 45 *n*

**Value of *n:***

| Decimal | Hex | | |
|---|---|---|---|
| 0, 48 | 30 | = | Cancel underline mode |
| 1, 49 | 31 | = | Select underline mode |
| 2, 50 | 32 | = | Select double thickness underline mode |

**Default:** 0 (Cancel underline mode)

Turns underline mode on or off. Underlines cannot be printed for spaces set by the horizontal tab, set absolute start position, or set relative print position commands.

This command and the Select Print Mode(s) command (1B 21) turn underline on and off in the same way.

**Exceptions**

This command is ignored if *n* is out of the specified range.

**Related information**

In A793 emulation, this command is unrecognized and the parameter *n* is put into the print buffer.

### Copy character set from ROM to RAM

**ASCII** ESC : 0 0 0
**Hexadecimal** 1B 3A 30 30 30
**Decimal** 27 58 0 0 0

**Default:** Current active ROM code page

Copies characters in the active ROM set to RAM. Use this command to re-initialize the user-defined character set. Code page 437 is copied by default at initialization.

This command is ignored if current font is the user font.

**Related information**

To modify characters in one of the character set variations, such as rotated print, select one of the rotated print commands, copy to RAM, then use the define user-defined character set command (1B 26).

### Cancel user-defined character

**ASCII** ESC ? *n*
**Hexadecimal** 1B 3F *n*
**Decimal** 27 63 *n*

**Value of *n*:** Specified character code.

**Range of *n*:** 32–255

Cancels the pattern defined for the character code specified by *n*. After the user-defined character is canceled, the corresponding pattern from current active ROM code page is printed.

**Exceptions**

This command is ignored if *n* is out of range or if the user-defined character is not defined.

### Select or cancel emphasized mode

**ASCII** ESC E *n*
**Hexadecimal** 1B 45 *n*
**Decimal** 27 69 *n*

**Value of *n*:** 0 (bit 0) not selected
1 (bit 0) selected

(When 0 and 1 are the least significant bit, LSB)

**Range of *n*:** 0-255

**Default:** 0 (Off)

Starts or stops emphasized printing. The printer is reset to the standard print mode after a clear printer (0x10) command is received.

**Exceptions**

Only the lowest bit of *n* is effective. Emphasized printing cannot be used with bit-images or downloaded bit-images.

**Related information**

This command and the select print mode(s) command (1B 21) function identically. They should have the same setting when used together.

In A793 emulation, this command is unrecognized and the parameter byte is put into the print buffer.

## Select or cancel double-strike

**ASCII** ESC G *n*
**Hexadecimal** 1B 47 *n*
**Decimal** 27 71 *n*

**Value of *n:*** 0 = Off
1 = On

(When 0 and 1 are the least significant bit, LSB)

**Default:** 0 (Off)

Turns double-strike mode on or off. Identical to emphasized mode. The printer is reset to the standard print mode after a clear printer (0x10) command is received.

**Exceptions**

Only the lowest bit of *n* is effective. The settings do not apply in page mode. However they can be set or cleared in page mode.

Double-strike printing cannot be used with bit-images or downloaded bit-images.

**Related information**

This command and the select print mode(s) command (1B 21) function identically. They should have the same setting when used together.

In A793 emulation, this command is unrecognized and the parameter byte is put into the print buffer.

## Select or cancel italic print

**ASCII** ESC I *n*
**Hexadecimal** 1B 49 *n*
**Decimal** 27 73 *n*

**Value of *n:*** 0 = Off
1 = On

(When 0 and 1 are the least significant bit, LSB)

**Default:** 0 (Off)

Turns italic print mode on or off. The printer is reset to the standard print mode after a clear printer (0x10) command is received.

**Exceptions**

Only the lowest bit of *n* is valid.

**Related information**

This command is recognized in A798 native mode and A794 emulation.

In A793 and LEGACY emulations, the parameter byte is put into the buffer.

### Select international character code

**ASCII** ESC R *n*
**Hexadecimal** 1B 52 *n*
**Decimal** 27 82 *n*

**Value of *n:***

| A798 native mode | A793 emulation | Application Compatible Escape Command emulation (1B 52 n only) |
|---|---|---|
| 0 = Code Page 437 | 0 = Code Page 437 | 0 = U.S.A. |
| 1 = Code Page 850 | Not 0 = Code Page 850 | 1 = France |
| 2 = Code Page 852 | | 2 = Germany |
| 3 = Code Page 860 | | 3 =-U.K. |
| 4 = Code Page 863 | | 4 = Denmark I |
| 5 = Code Page 865 | | 5 = Sweden |
| 6 = Code Page 858 | | 6 = Italy |
| 7 = Code Page 866 | | 7 = Spain |
| 8 = Code Page 1252 | | 8 = Japan |
| 9 = Code Page 862 | | 9 = Norway |
| 10 = Code Page 737, Greek (only in A798 native mode) | | |
| 12 = Code Page 857 | | |

**Default:** 0 (Code Page 437)

Selects the character set to be used. Look in "Appendix B: Resident Character Sets" in the *A798 User Guide* for the character sets.

There are two codes for this command (see select international character set, 1B 74 *n*). Both codes perform the same function.

**Related information**

The LEGACY emulation selection applies only to the command "Select international character code" (1B 52 *n*). The LEGACY emulation generates the same as A798 native mode for the command "Select international character set table" (1B 74 *n*).

### Select or cancel 90 degree clockwise rotated print

**ASCII** ESC V *n*
**Hexadecimal** 1B 56 *n*
**Decimal** 27 86 *n*

**Value of *n:*** 0 = Cancel
1 = Set

**Default:** 0 (Cancel)

Rotates characters 90 degrees clockwise. The command remains in effect until the printer is reset or until a clear printer (0x10) or rotated print (1B 12) command is received. See summary of rotated printing in this document.

### Select international character set

**ASCII:** ESC t *n*
**Hexadecimal:** 1B 74 *n*
**Decimal:** 27 116 *n*

**Value of *n:***

| A798 native mode emulation | A793 emulation | Application Compatible Escape Command (1B 52 n only) |
|---|---|---|
| 0 = Code Page 437 | 0 = Code Page 437 | 0 = U.S.A. |
| 1 = Code Page 850 | Not 0 = Code Page 850 | 1 = France |
| 2 = Code Page 852 | | 2 = Germany |
| 3 = Code Page 860 | | 3 =-U.K. |
| 4 = Code Page 863 | | 4 = Denmark I |
| 5 = Code Page 865 | | 5 = Sweden |
| 6 = Code Page 858 | | 6 = Italy |
| 7 = Code Page 866 | | 7 = Spain |
| 8 = Code Page 1252 | | 8 = Japan |
| 9 = Code Page 862 | | 9 = Norway |
| 10 = Code Page 737, Greek (in A798 native mode and A794 emulation) | | |
| 12 = Code 857 | | |

**Default:** 0 (Code Page 437)

Selects the character set to be used. Look in "Appendix B: Resident Character Sets" in the *A798 User Guide Programming Supplement* for the character sets.

There are two codes for this command (See "Select international character code, 1B 52 *n*.) Both codes perform the same function.

**Related information**

The LEGACY emulation selection applies only to the command "Select international character code" (1B 52 *n*).
The LEGACY emulation generates the same as A798 native mode for the command "Select international character set" (1B 74 *n*).

### Select or cancel upside-down print mode

**ASCII** ESC { *n*
**Hexadecimal** 1B 7B *n*
**Decimal** 27 123 *n*

**Value of *n:*** 0 = Cancel
1 = Set

**Default:** 0 (Cancel)

Prints upside-down characters. The command may be combined with clockwise rotated print (1B 56) or counter-clockwise rotated print (1B 12). The character order is inverted in the buffer so text is readable. Only bit 0 is used. Bits 1-7 are not used. See summary of rotated printing in this document for more information.

**Exceptions**

The command is valid only at the beginning of a line.

It cannot be used with right side up characters on the same line.

## Select character size

**ASCII** GS ! *n*
**Hexadecimal** 1D 21 *n*
**Decimal** 29 33 *n*

**Value of *n*:** 1–8 = vertical number of times active font
1–8 = horizontal number of times active font

**Range of *n*:** 00–07, 10–17, ...70–77

**Default of *n*:** 11 hexadecimal

Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 6, as follows: With smoothing enabled, maximum value of 0 + *n* is 66.

**Character width selection**

| Hex | Decimal | Width |
|---|---|---|
| 00 | 0 | 1 (normal) |
| 10 | 16 | 2 (two times width) |
| 20 | 32 | 3 (three times width) |
| 30 | 48 | 4 (four times width) |
| 40 | 64 | 5 (five times width) |
| 50 | 80 | 6 (six times width) |
| 60 | 96 | 7 (seven times width) |
| 70 | 112 | 8 (eight times width) |

**Character height selection**

| Hex | Decimal | Height |
|---|---|---|
| 00 | 0 | 1 (normal) |
| 01 | 1 | 2 (two times height) |
| 02 | 2 | 3 (three times height |
| 03 | 3 | 4 (four times height) |
| 04 | 4 | 5 (five times height) |
| 05 | 5 | 6 (six times height) |
| 06 | 6 | 7 (seven times height) |
| 07 | 7 | 8 (eight times height) |

This command is effective for all characters (except for HRI characters).

In standard mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90 degree clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.

In page mode, vertical and horizontal directions are based on the character orientation. When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.

The select print mode (1B 21 *n*) command can also select or cancel double-width and double-height modes. However, the setting of the last received command is effective.

**Exceptions**

If *n* is out of the defined range, this command is ignored.

In native mode, the vertical direction is limited to 7 (seven times height) when Tall or ColorPOS® font is selected. If 8 (eight times height) is selected, the results are unspecified.

**Related information**

In A793 emulation, this command is discarded and not put into print buffer.

## Select or cancel white/black reverse print mode

**ASCII** GS B *n*
**Hexadecimal** 1D 42 *n*
**Decimal** 29 66 *n*

**Value of *n*:** 0 = Off
1 = On

(When 0 and 1 are the least significant bit, LSB)

**Range of *n*:** 0–255

**Default:** 0 (Off)

Turns on white/black reverse print mode. In white/black reverse print mode, print dots and non-print dots are reversed, which means that white characters are printed on a black background. When the white/black reverse print mode is selected it is also applied to character spacing which is set by right-side character spacing (1B 20).

This command can be used with built-in characters and user-defined characters, but does not affect the space between lines.

White/black reverse print mode does not affect bit image, downloaded bit image, bar code, HRI characters, and spacing skipped by horizontal tab (09), set absolute starting position (1B 24 …), and set relative print position (1B 5C).

White/black reverse print mode has a higher priority than underline mode. When underline mode is on and white/black reverse print mode is selected, underline mode is disabled, but not canceled.

Bar codes, logos, and bit images are not affected by this command.

**Exceptions**

Only the lowest bit of *n* is valid.

Related information

In A793 emulation, the command is unrecognized and the parameter byte is put into the print buffer.

## Select superscript or subscript modes

**ASCII** US ENQ *n*
**Hexadecimal** 1F 05 *n*
**Decimal** 31 05 *n*

**Value of *n*:** 0 = Normal character size
1 = Select subscript size
2 = Select superscript size

**Default:** 0 (normal size)

Turns superscript or subscript modes on or off. This attribute may be combined with other characters size settings commands (12, 13, 1B 21 *n*, 1D 21 *n*,…)

**Exceptions**

This command is ignored if *n* is out of the specified range.

**Related information**

In A793 emulation, this command is unrecognized and the parameter byte is put into the print buffer.

### Select active user-defined character set

Selects user-defined character set number for download or printing. The default at power on is 0.

**ASCII** US *i n*
**Hexadecimal** 1F 69 *n*
**Decimal** 31 105 *n*

n = 0 - 127 Set high order bit of *n* to configure user-defined character set number as the default. To configure the printer to print from the user-defined character set at power, send 1F 03 0F 01 and reset the printer. Information will print on the first diagnositic page.

## Graphics

These commands are used to enter and print graphics data and are described in order of their hexadecimal codes.

These commands describe operation for 80mm paper. If the printer supports 82.5mm paper, the dot spacing is the same but there are 640 printable dots rather than 576 printable dots on 80 mm paper.

### Download BMP logo

**ASCII:** ESC (+*.BMP file)
**Hexadecimal:** 1B (+*.BMP file)
**Decimal:** 27 66 77(+*.BMP file)

**Value:** Maximum width = 576 (640 for 82.5mm paper)
Maximum height = 512

Enters a downloaded BMP logo into RAM or flash.

The downloaded BMP logo can be printed by using the print downloaded bit image (1D 2F *m*) command.

To downloaded BMP file to save it as a logo, send the hexadecimal code 1B followed by the whole BMP file.

The printer decodes the BMP file header and will save the image data after checking important parameters, such as:

- Width,
- Height,
- Number of colors (only monochrome images are accepted)

BMPs and bit images continue to be definable only for the receipt station. However, there is no longer an automatic erasure whenever the user downloads a character set (as happened previously) as well as in the case where the current logo was never set > 0, (the automatic erasure if user flash memory had filled up with inactive logo 0 definitions upon next power cycle). Warnings about the effect of running out of defined logo space during a download apply (i.e. the command is ignored). The application is required to manage user data space, downloaded font space, and logo space.

After downloading a logo to the printer, wait 100ms to allow the printer time to write the logo to flash.

#### Exceptions

BMP file images that are not monochrome are put into the print buffer.

#### Related information

Microsoft BMP bitmap file format.

This command is recognized in A798 native mode and in A794 emulation.

In A793 and LEGACY emulations, the BMP file bytes are put into the print buffer.

## Select bit image mode

**ASCII** ESC * *m n*1 *n*2 *d*1 ... *d*n
**Hexadecimal** 1B 2A *m n*1 *n*2 *d*1 ... *d*n
**Decimal** 27 42 *m n*1 *n*2 *d*1 ... *d*n

**Value of *m*:**

| Value of *m* | Mode | No. of dots (vertical) | No. of dots (horizontal) | No. of dots/line |
|---|---|---|---|---|
| 0 | 8-dot single-density | 8 (68 DPI) | 0–288 (101 DPI) | 8 x 288 |
| 1 | 8-dot double-density | 8 (68 DPI) | 0–576 (203 DPI) | 8 x 576 |
| 32 | 24-dot single-density | 24 (203 DPI) | 0–288 (101 DPI) | 24 x 288 |
| 33 | 24-dot double-density | 24 (203 DPI) | 0–576 (203 DPI) | 24 x 576 |

**Value of *n:***

| Value of *n* (8-dot single-density mode) | Value of *n* (24-dot single-density mode) | Value of *d* |
|---|---|---|
| n1 + (256 x n2) | 3 x [n1 + (256 x n2)] | Number of bytes of data* |

*Printed left to right (8-dot mode); printed down then across (24-dot mode)

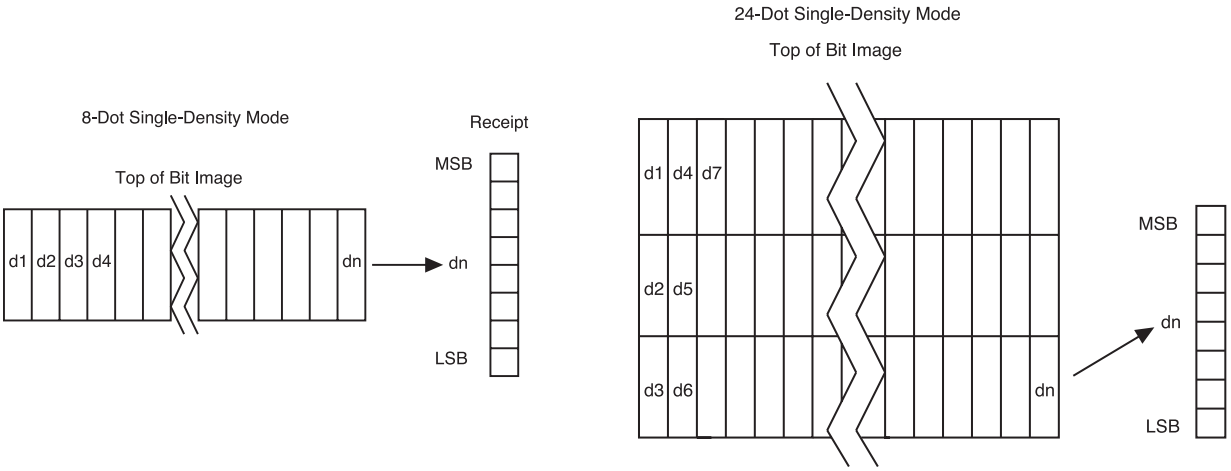
**Formulas**

**8-dot single-density= *n*1 + (256 X *n*2)**

**24-dot single-density= 3 X [*n*1+ (256 X *n*2)]**

Sets the print resolution and enters one line of graphics data into the print buffer. Excess data is accepted but ignored. Any print command is required to print the data, after which the printer returns to normal processing mode.

See the illustration for graphic representations of the bit image below.



### Print advanced raster graphics

**ASCII** ESC . *m n rL rH d1 … dn*
**Hexadecimal** 1B 2E *m n rL rH d1 … dn*
**Decimal** 27 46 *m n rL rH d1 … dn*

**Value of *m:*** horizontal offset from left margin = 8 x *m* dots

**Value of n*:*** number of data bytes that compose the raster

**Value of r*:*** number of times the raster has to be printed =256 x *rH* + *rL*

**d1 … dn:** data bytes

**Range:** 0<= *m* <= 72
0<= *n* <= 72
0<= *r* <= 65535
0<= *d1 … dn* <= 255

Prints a horizontal raster of graphics data one or multiple times. Horizontal offset and number of data bytes are variable and specified by parameters.

**Exceptions**

Advanced raster graphics is not available in page mode.

### Select single-density graphics

**ASCII** ESC K *n*1 *n*2 *d*1 ... *d*n
**Hexadecimal** 1B 4B *n*1 *n*2 *d*1 ... *d*n
**Decimal** 27 75 *n*1 *n*2 *d*1 ... *d*n

**Value of *n:***

| Value of *n* (8-dot single-density mode) | Value of *d* |
|---|---|
| n1 + (256 x n2) | Number of bytes of data (printed down, then across) |

Enters one line of 8-dot single-density graphics into the print buffer. Any print command is required to print the line, after which the printer returns to normal processing mode. Single-density mode allows 0–288 dot columns. The number of bytes sent is represented by the formulas in the table.

Each bit corresponds to two horizontal dots. Compare to set bit image mode (1B 2A, m = 0) earlier in this document.

**Related information**

In LEGACY emulation, this command is unrecognized and the parameters are put into the print buffer.

### Select double-density graphics

**ASCII** ESC Y *n*1 *n*2 *d*1 ... *d*n
**Hexadecimal** 1B 59 *n*1 *n*2 *d*1 ... *d*n
**Decimal** 27 89 *n*1 *n*2 *d*1 ... *d*n

**Value of *n:***

| Value of *n* (8-dot single-density mode) | Value of *d* |
|---|---|
| n1 + (256 x n2) | Number of bytes of data (printed down, then across) |

Enters one line of 8-dot double-density graphics into the print buffer. Any print command is required to print the line, after which the printer returns to normal processing mode. Double-density mode allows 0–576 dot columns. The number of bytes sent is represented by the formulas in the table.

Each bit corresponds to one horizontal dot. Compare to set bit image mode (1B 2A, m=1) earlier in this document.

**Related information**

In LEGACY emulation, this command is unrecognized and the parameters are put into the print buffer.

### Print Flash Logo

**ASCII** FS p *n m*
**Hexadecimal** 1C 70 *n m*
**Decimal** 28 112 *n m*

Print flash logo ID *n* using mode *m*. See command 1D 2F *m* for description of mode *m*. See command 1C 71 for description of *n*.

### Define Flash Logos

**ASCII** FS *q n* [xL xH yL yH d1 …dk]1…[xL xH yL yH d1 …dk]*n*
**Hexadecimal** 1C 71 *n* [xL xH yL yH d1 …dk]1…[xL xH yL yH d1 …dk]*n*
**Decimal** 28 113 *n* [xL xH yL yH d1 …dk]1…[xL xH yL yH d1 …dk]*n*

Define *n* flash logos specified by IDs 1 through *n*. Maximum size of logos is determined by amount of flash allocated to logos. See command 1D 22 80… for flash allocation.

0 < xH:xL < 1024 max printable xH:xL = 72 = 576 dots wide

0 < yH:yL < 256

For each logo definition: xH:xL times 8 dots in the horizontal direction, yH:yL times 8 dots in the vertical direction. Total data definition bytes k = xH:xL times yH:yL times 8 bytes. See command 1D 2A x y … for description of data definition bytes arrangement.

During execution of this command printer turns off USM and Real Time status processing. The printer goes busy when writing to flash. At the end of this command the printer resets.

### Select the current logo

**ASCII** GS # *n*
**Hexadecimal** 1D 23 *n*
**Decimal** 29 35 *n*

**Range of *n*:** 0 – 255

**Default:** 0

Selects a color or monochrome logo to be defined or printed. The active logo *n* remains in use until this command is sent again with a different logo *n*.

When this command precedes a logo definition, that definition is stored in flash or RAM memory as logo *n*. If there is already a different definition in flash memory for logo *n*, the first is inactivated and the new definition is used. The inactive definition is not erased from flash and continues to take up space in flash memory.

When this command precedes a logo print command and *n* is different from the previously active logo selected, the printer retrieves the logo definition for *n* from flash or RAM memory and prints it. If there is no definition for logo *n*, then no logo is printed.

In the case of a previously existing application that expects only one possible logo, the printer will not receive the select current logo (1D 23 *n*) command. In this case, the printer assigns 0 as the active logo identifier. It automatically stores any new logo definition in flash memory as logo 0, inactivating any previous logo 0 definition. If the flash memory space available for logos fills up with inactive logo 0 definitions, the firmware erases the old definitions at the next power cycle. This is the only case in which the printer erases flash memory without an application command.

In the case of a new application using multiple logos, the select current logo (1D 23 *n*) command is used. After that, the printer no longer automatically erases the logo definition flash memory page when it fills with multiple definitions. A new application using multiple logos, writing a user-defined character set into flash memory, or both, is responsible for erasing the logo and user-defined character set flash memory page when the logo area is full or before a new character set is defined.

#### Related information

This command is recognized in A798 native mode and A794 emulation.

In A793 and LEGACY emulations, the parameters are put into the print buffer.

## Define downloaded bit image

**ASCII** GS * *n*1 *n*2 *d*1 ... *dn*]
**Hexadecimal** 1D 2A *n*1 *n*2 *d*1 ... *dn*]
**Decimal** 29 42 *n*1 *n*2 *d*1 ... *dn*]

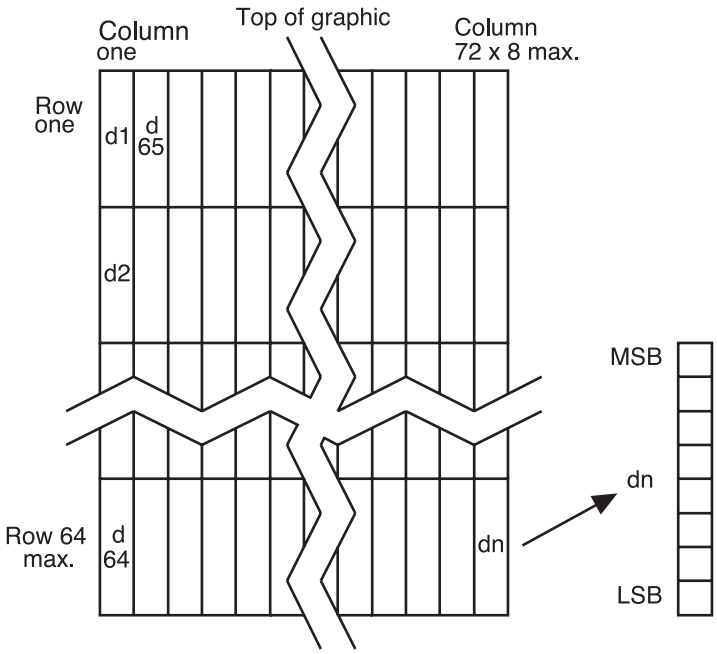
**Value of *n*:**

| Value of *n*1 | Value of *n*2 | Value of *d* |
|---|---|---|
| 1–72 (8 x n1 = number of horizontal dot columns) | 1–64 (number of vertical bytes) | Bytes of data (printed down, then across) |

[1]The number of bytes sent is represented by the following formula:
*n* = 8 x *n*1 x *n*2 (*n*1 x *n*2 must be less than or equal to 4608).

Enters a downloaded bit image (such as a logo) into RAM or flash with the number of dots specified by *n*1 and *n*2. If in RAM, the downloaded bit image is available until power is turned off, another bit image is defined, or initialize printer (1B 40) command is received. This bit image will be saved as a monochrome logo indexed by current value that was last set by the select current logo command or 0 is a select current logo command had not yet been given.

See the illustration below for a graphic representation of the downloaded bit image.



### Print downloaded bit image

**ASCII** GS / *m*
**Hexadecimal** 1D 2F *m*
**Decimal** 29 47 *m*

**Value and range of *m:***

This command is used to print a previously stored monochrome or color logo from printer memory on the receipt station. The logo is identified as the one indicated by the most recent select current logo command or 0 if a select current logo command has not yet been given. Parameter m is interpreted as follows:

| Value of *m* | Print mode | Vertical DPI | Horizontal DPI |
|---|---|---|---|
| 0 | Normal | 203 | 203 |
| 1 | Double wide | 203 | 101 |
| 2 | Double high | 101 | 203 |
| 3 | Quadruple | 101 | 101 |

The indexed downloaded bit image from RAM or flash will be printed on the receipt station at a size specified by *m*. If doubling or quadrupling exceeds the print paper width maximums (576 or 640 with 82.5mm paper) the left side of the image is printed and the bits to the right of the maximum column are discarded. If the available width is greater than the bit image, its printing will adhere to any currently set right, left, or center justification. This command is ignored if the index refers to an undefined logo/ bit image.

### Convert 6-dots/mm bitmap to 8-dots/mm bitmap

**ASCII** US EOT *n*
**Hexadecimal** 1F 04 *n*
**Decimal** 31 04 *n*

**Value:** 0 = Off
1 = On

(When 0 and 1 are the LSB)

**Default:** 0 (Off)

Selects or cancels 6-dot/mm emulation mode.

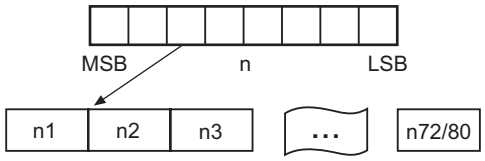
When the 6-dot/mm emulation is selected, logos and graphics are expanded horizontally and vertically during download to emulate their size on a 6-dot/mm printer. The horizontal positioning commands also emulate positioning on a 6-dot/mm printer.

### Print raster graphics

**ASCII** DC1 *n1…..nl* (576 dots) for 80 mm paper, or *n80* (640 dots) for 82.5 mm paper
**Hexadecimal** 11 *n1…..n72* (576 dots) for 80 mm paper, or *n80* (640 dots) for 82.5 mm paper
**Decimal** 17 *n1…..nl* (576 dots) for 80 mm paper, or *n80* (640 dots) for 82.5 mm paper

**Value and range of *n:*** *n1* to *n72/n80* corresponds to one dot row data for a thermal receipt printer.

Each bit defines whether or not a dot will be printed. This command is used for printing a graphic in real-time. Offsets, page and any other modes or overlays, including watermark do not apply and are overridden by this command. A complete rendering of the intended final image should have been done by the application before sending the dot rows.




## Status

### Status command introduction

The A798 has three methods of providing status to the application. These methods are through batch status commands, real time status commands and unsolicited status mode. An application may use one or more of these methods to understand the current status of the printer. A brief description of each of these methods follows.

**Batch status commands** – These commands are sent to the printer and stored in the printer's buffer. Once the printer has processed all the previous commands these commands are processed and the proper status is returned to the application. In the event a condition causes the printer to go BUSY, it stops processing commands from the printer buffer. If a batch status command remained in the buffer during this busy condition, it would not be processed. In fact, no batch commands are processed while the printer is in this state.

**Real-time commands** – These commands are sent to the printer buffer. Periodically, when the printer has time, it scans the input buffer looking for these commands. When found by the printer, these commands are processed immediately. This gives the application the ability to query the printer when it is in a busy state in order to correct whatever fault has occurred.

**Unsolicited status mode** – This mechanism allows the application developer to program the printer to automatically respond with a four byte status when certain conditions in the printer change.

Please see the subsequent sections for a more detailed description of these status commands. At the end of this status commands section is a page entitled "Recognizing data from the printer". This describes how to interpret what command or setting (in the case of unsolicited status mode) triggered a response from the printer.

### Batch mode

For RS-232C printers, these commands enable the printer to communicate with the host computer following the selected handshaking protocol, either DTR/DSR or XON/XOFF. They are stored in the printer's data buffer as they are received, and are handled by the firmware in the order in which they are received.

When a fault occurs, the printer will go busy at the RS-232C interface and not respond to any of the batch mode printer status commands. If the fault causing the busy condition can be cleared, such as by loading paper, or letting the thermal printhead cool down, the printer will resume processing the data in its receive buffer.

### Transmit peripheral device status (RS-232C printers only)

**ASCII** ESC u 0
**Hexadecimal** 1B 75 0
**Decimal** 27 117 0

**Value of returned byte:**

| Bit 0 | Bit 1 |
|---|---|
| 1 = Drawer 1 Closed | 1 = Drawer 2 Closed |
| 0 = Drawer 1 Open | 0 = Drawer 2 Open |

Bits 2–7 are not used.

Transmits current status of the cash drawers. One byte is sent to the host computer. In DTR/DSR protocol, the printer waits for DSR = SPACE. If a drawer is not connected, the status will indicate it is closed.

**Exceptions**

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A798 has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

**Related information**

In LEGACY emulation, this command is ignored.

### Request alternate status (A793 emulation only)

**ASCII** ESC u *n*
**Hexadecimal** 1B 75 *n*
**Decimal** 27 117 *n*

**Value and Range of *n:***

| Value of *n* | Function | Description |
|---|---|---|
| 00 | Drawer 1 | High = Open<br>Low = Closed or Not Present |
| 01 | Drawer 2 | High = Open<br>Low = Closed or Not Present |
| 02 | Paper Low<br>(Not Implemented. Interpreted as Paper Out.) | High = Paper Out<br>Low = Paper Present |
| 03 | Paper Out (Default) | High = Paper Out<br>Low = Paper Present |
| >03 | Ignored, No Change | Printer Does Not Stay BUSY[1] |

[1]PAPER EXHAUST LINE is valid to indicate previously requested status.

This command allows the printer to inform the host when the data in the buffer has been processed. The PAPER EXHAUST line shows the status for the cash drawer or receipt paper as shown in the table.

Status information is limited to what can be sent by the dedicated lines: BUSY, ACK, PAPER EXHAUST, and FAULT.

**Exceptions**

Parallel communications only.

### Transmit paper sensor status

**ASCII** ESC v
**Hexadecimal** 1B 76
**Decimal** 27 118

**Values:**

**Status Byte (RS-232C)**

| Bit | Function | 0 Signifies | 1 Signifies |
|---|---|---|---|
| 0 | Receipt paper low sensor is enabled) | Present | Low (only if paper |
| 1 | Receipt cover | Closed | Open |
| 2 | Receipt paper | Present | Out |
| 3 | Knife position | Home position | Not home position |
| 4 | Not used | Fixed to zero | Fixed to zero |
| 5 | Temperature | In valid range | Too hot or too cold |
| 6 | Voltage | In valid range | Too high or too low |
| 7 | Not used | Fixed to zero | Fixed to zero |

Sends status data to the host computer. The printer sends one byte to the host computer when it is not busy or in a fault condition. In DTS/DSR protocol, the printer waits for DSR = SPACE.

**Related information**

See busy line and fault conditions in the real time commands section of this document for details about fault condition reporting.

In LEGACY emulation, this command is ignored.

### Transmit printer ID

**ASCII** GS I *n*
**Hexadecimal** 1D 49 *n*
**Decimal** 29 73 *n*

**Value of *n*:** 1, 49 = Printer model ID
2, 50 = Type ID
3, 51 = ROM version ID
4, 52 = Logo Definition

Transmits the printer ID specified by *n* as follows:

| n | Printer ID | Specification | ID (Hexadecimal) |
|---|---|---|---|
| 1, 49 | Printer model ID | A798 | 0x24 |
| 2, 50 | Type ID | Installed options | Refer to below |
| 3, 51 | ROM version ID | ROM version | 0x00 |
| 4, 52 | Logo definition | Logo definition | Refer to next column |

***n* = 2 or 50: Type ID**

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | No two-byte character code installed. |
| | On | 01 | 1 | Two-byte character code installed. |
| 1 | Off | 00 | 0 | No knife installed. |
| | On | 02 | 2 | Knife installed. |
| 2 | – | – | – | Undefined. |
| 3 | – | – | – | Undefined. |
| 4 | Off | 00 | 0 | Not used. Fixed to Off. |
| 5 | – | – | – | Undefined |
| 6 | – | – | – | Undefined |
| 7 | Off | 00 | 0 | Not used. Fixed to Off. |

***n* = 4 or 52: Logo Definition**

| Bit | Off/On | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | No logo downloaded (SRAM or Flash) |
| | On | 01 | 1 | Logo downloaded (SRAM or Flash) |
| 1–7 | Off | 00 | 0 | Not Used. Fixed to Off. |

Transmits the printer ID specified by *n*. This command is a batch mode command; that is, the response is transmitted after all prior data in the receive buffer has been processed. There may be a time lag between the printer receiving this command and transmitting the response, depending on the receive buffer status.

### Transmit printer ID, remote diagnostics extension

**ASCII** GS I @ *n*
**Hexadecimal** 1D 49 40 *n*
**Decimal** 29 73 64 *n*

**Values of *n:*** Refer to table

**Range of *n:*** 32–255 (not all defined, but reserved)

Eighteen remote diagnostic items are defined in the following table: eight printer ID items and ten printer tally items. A group of four remote diagnostic functions is assigned to each diagnostic item. Most of the diagnostic items are maintained in non-volatile memory (NVRAM), but some are maintained in read-only memory (ROM).

The first item group in the table includes an example of data to send and to receive. Data sent from the host to write to NVRAM must contain all digits required by the remote diagnostic item. All data must be ASCII. The printer returns all ASCII data. It is preceded by the parameter *n* to identify the diagnostic item and is followed by a carriage return (0D) to signify the end of the data.

Each returned message is defined as: *n* + data + <CR>

The command performs the remote diagnostic function specified by *n* as described in the following table.

| **Value of *n*** | | | | |
|---|---|---|---|---|
| **ASCII** | **Hex** | **Dec** | **Remote diagnostic item** | **Function** |
| Space | 20 | 32 | Serial #, 10 digit ASCII | Write to NVRAM Example, send 14 bytes to printer: GS I @ 0x20 1234567890 |
| ! | 21 | 33 | Serial # | Write to NVRAM, and print on receipt to verify Example, send 14 bytes to printer: GS I @ ! 1234567890 This will print on receipt: Serial # written: 1234567890 |
| # | 23 | 35 | Serial # | Return Serial #, preceded by *n* to identify Printer returns 12 bytes in above example: #1234567890<CR> |
| $ | 24 | 36 | Class/model #, 15 digit ASCII | Write to NVRAM |
| % | 25 | 37 | Class/model # | Write to NVRAM, and print on receipt to verify |
| ‘ | 27 | 39 | Class/model # | Return Class/model #, returns 17 bytes |
| + | 2B | 43 | Boot firmware part #, 12 digit ASCII | Return Boot firmware part #, returns 14 bytes |
| / | 2F | 47 | Boot firmware CRC, 4 digit ASCII | Return Boot firmware CRC, returns 6 bytes |
| 3 | 33 | 51 | Flash firmware part #, 12 digit ASCII | Return Flash firmware part #, returns 14 bytes |
| 7 | 37 | 55 | Flash firmware CRC, 4 digit ASCII | Return Flash firmware CRC, returns 6 bytes |
| Ç | 80 | 128 | Receipt lines tally, 8 digit ASCII numeric, max 99,999,999 | Write to NVRAM Example, send 12 bytes to printer: GS I @ Ç00010000 To set receipt lines tally to 10,000 |
| ü | 81 | 129 | Receipt lines tally | Write to NVRAM, and print on receipt to verify Example, send 12 bytes to printer: GS I @ ü00010000 This will print on receipt: Receipt tally written: 10,000 |
| é | 82 | 130 | Receipt lines tally | Clear receipt lines tally to 0 |
| â | 83 | 131 | Receipt lines tally | Return receipt lines tally, preceded by *n* to identify Printer returns 10 bytes in above example: â00010000<CR> |
| ä | 84 | 132 | Knife cut tally, 8 digit ASCII numeric, max 99,999,999 | Write to NVRAM |
| à | 85 | 133 | Knife cut tally | Write to NVRAM, and print on receipt to verify |

| Value of *n (continued)* | | | | |
|---|---|---|---|---|
| **ASCII** | **Hex** | **Dec** | **Remote diagnostic item** | **Function** |
| å | 86 | 134 | Knife cut tally | Clear knife cut tally to 0 |
| ç | 87 | 135 | Knife cut tally | Return knife cut tally, returns 10 bytes |
| É | 90 | 144 | Hours on tally, 8 digit ASCII numeric, max 99,999,999 | Write to NVRAM |
| æ | 91 | 145 | Hours on tally | Write to NVRAM, and print on receipt to verify |
| Æ | 92 | 146 | Hours on tally | Clear Hours on tally to 0 |
| ô | 93 | 147 | Hours on tally | Return hours on tally, returns 10 bytes |
| ù | 97 | 151 | Boot firmware version | Return boot firmware version, returns 6 bytes |
| ú | A3 | 163 | Flash firmware version | Return flash firmware version, returns 6 bytes |
| ñ | A4 | 164 | Flash cycles tally, 8 digit ASCII numeric, max 99,999,999 | Write to NVRAM |
| Ñ | A5 | 165 | Flash cycles tally | Write to NVRAM, and print on receipt to verify |
| a | A6 | 166 | Flash cycles tally | Clear flash cycles cut tally to 0 |
| o | A7 | 167 | Flash cycles tally | Return flash cycles cut tally, returns 10 bytes |
| ¿ | A8 | 168 | Knife jams tally, 8 digit ASCII numeric, max 99,999,999 | Write to NVRAM |
| + | A9 | 169 | Knife jams tally | Write to NVRAM, and print on receipt to verify |
| + | AA | 170 | Knife jams tally | Clear knife jams tally to 0 |
| ½ | AB | 171 | Knife jams tally | Return knife jams tally, returns 10 bytes |
| ¼ | AC | 172 | Cover openings tally, 8 digit ASCII numeric, max 99,999,999 | Write to NVRAM |
| ¡ | AD | 173 | Cover openings tally | Write to NVRAM, and print on receipt to verify |
| « | AE | 174 | Cover openings tally | Clear cover openings tally to 0 |
| » | AF | 175 | Cover openings tally | Return cover openings tally, returns 10 bytes |
| | B2 | 178 | Max temperature tally | Reset max temperature reached value |
| \| | B3 | 179 | Max temperature tally | Return max temperature reached since it was reset, returns 10 bytes |

### Transmit status

**ASCII** GS r *n*
**Hexadecimal** 1D 72 *n*
**Decimal** 29 114 *n*

**Value of *n*:** 1, 49 = printer status
2, 50 = cash drawer status
4, 52 = Flash memory user sector status

Transmits the status specified by *n*. This is a batch mode command which transmits the response after all prior data in the receive buffer has been processed. There may be a time lag between the printer receiving this command and transmitting the response, depending on the receive buffer status.

When DTR/DSR RS-232C communications handshaking control is selected, the printer transmits the one byte response only when the host signal DSR indicates it is ready to receive data.

When XON/XOFF RS232C communications handshaking control is selected, the printer transmits the one byte response regardless of the host signal DSR.

The status bytes to be transmitted are described in the three tables on the next page.

#### Exceptions

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A798 has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

**Printer status (*n* = 1 or *n* = 49)**

| Bit | Off/On | Hex | Decimal | Status for transmit status |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Paper present. |
| | On | 01 | 1 | Paper exhausted. |
| 1 | Off | 00 | 0 | Cover closed. |
| | On | 02 | 2 | Cover open. |
| 2 | Off | 00 | 0 | Paper present. |
| | On | 04 | 4 | Paper exhausted. |
| 3 | – | – | – | Undefined. |
| 4 | Off | 00 | 0 | Not used. Fixed to off. |
| 5 | – | – | – | Undefined. |
| 6 | – | – | – | Undefined. |
| 7 | Off | 00 | 0 | Not used. Fixed to off. |

**Cash drawer status (n = 2 or n = 50)**

| Bit | Off/On | Hex | Decimal | Status for transmit status |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | One or both cash drawers open. |
| | On | 01 | 1 | Both cash drawers closed. |
| 1 | Off | 00 | 0 | One or both cash drawers open. |
| | On | 02 | 2 | Both cash drawers closed. |
| 2 | – | – | – | Undefined |
| 3 | – | – | – | Undefined |
| 4 | Off | 00 | 0 | Not used. Fixed to off. |
| 5 | – | – | – | Undefined. |
| 6 | – | – | – | Undefined. |
| 7 | Off | 00 | 0 | Not used. Fixed to off. |

| Flash memory user sector status (*n* = 4 or *n* = 52) | | | | |
|---|---|---|---|---|
| **Bit** | **Off/On** | **Hex** | **Decimal** | **Status for transmit status** |
| 0 | – | – | – | Undefined. Fixed to off. |
| 1 | – | – | – | Undefined. Fixed to off. |
| 2 | Off | 00 | 0 | User data storage write successful |
| | On | 04 | 4 | User data storage write failed, specified area not erased. |
| 3 | Off | 00 | 0 | Flash logo area adequate, definition stored |
| | On | 08 | 8 | Flash logo area not adequate |
| 4 | Off | 00 | 0 | Not used. Fixed to off. |
| 5 | Off | 00 | 00 | No thermal user-defined characters written to flash. |
| | On | 20 | 32 | Thermal user-defined characters written to flash. |
| 6 | Off | 00 | 0 | Not used. Fixed to off. |
| 7 | – | – | – | Undefined. |

**Exceptions**

When *n* is out of the specified range, the command is ignored.

## Send printer software version

**ASCII** US V
**Hexadecimal** 1F 56
**Decimal** 31 86

The printer returns 8 bytes containing the boot and flash software version. The first 4 bytes returned are an ASCII string for the boot version.

The second 4 bytes are an ASCII string for the flash version. Example: For 1.234.56 (8 bytes), the boot version is 1.23 and the flash version is 4.56.

## Real time commands

The real time commands provide an application interface to the printer even when the printer is not handling other commands (RS-232C communication interface only):

- Real time status transmission: GS (Hex 1D) sequence and DLE (Hex 10) sequence
- Real time request to printer: GS (Hex 1D) sequence and DLE (Hex 10) sequence
- Real time printer status transmission

The batch mode printer status commands are placed in the printer's data buffer as they are received and handled by the firmware in the order in which they were received. If the paper exhausts while printing data that was in the buffer ahead of the status command, the printer goes busy at the RS-232C interface and suspends processing the data in the buffer until paper is reloaded. This is true for all error conditions: knife home error, thermal printhead overheat, etc. In addition, there is no way to restart the printer after a paper jam or other error, when using batch mode status commands.

The real time commands are implemented in two ways in order to overcome the limitations of batch mode status commands. Both implementations offer the same functionality; which one you choose depends on the current usage of your application.

### Preferred implementation

For a new application the GS (1D) sequences are recommended to avoid possible misinterpretation of a DLE (0x10) sequence as a clear printer (0x10 0, ASCII DLE NUL) command.

An application using these GS (1D) sequences, does not need to distinguish for the printer between the new real time commands and the clear printer command. This implementation is ideal for an existing A756 application that already uses the clear printer command or for a new application being developed.

### Alternate implementation

The alternate implementation uses the DLE (0x10) sequences as implemented on other printers. An application using these DLE (0x10) sequences and the original A756 clear printer command (0x10) must distinguish for the printer between the new real time commands and the clear printer command by adding a NUL (0x00) to the clear printer command.

An application using these DLE (0x10) sequences must also send the second byte of the sequence within 100 milliseconds of the first, to prevent the first byte being mistaken for a clear printer command.

### Rules for using real time commands

Three situations must be understood when using real time commands.

First, the printer executes the real time command within a few msec of detecting it in the input buffer and will transmit status regardless of the condition of the DSR signal.

Second, the printer transmits status whenever it recognizes a real time status transmission command sequence, even if that sequence happens to occur naturally within the data of another command, such as graphics data.

In this case the sequence will also be handled correctly as the graphics data it is intended to be when the graphics command is executed from the buffer.

Third, care must be taken not to insert a real time command into the data sequence of another command that consists of two or more bytes.

In this case the printer will use the real time command sequence bytes instead of the other command's parameter bytes when finally executing that other command from the buffer; the other command will NOT be executed correctly.

These three situations generally preclude use of standard DOS drivers for the serial communication ports when using real time commands.

## Moving data through the buffer

Applications should not let the buffer fill up with real
time commands when the printer is busy at the RS-232C interface. A busy condition at the RS-232C interface can be determined by bit 3 of the response to 1D 05, or 1D 04 1, or 10 04 1. The reason for a particular busy condition can be determined by other responses to 1D 04 *n* or 10 04 *n*.

Although the printer responds to real time commands when it is busy, it will place them into the buffer behind any other data there, and flush them out in the order in which they were received. When the printer is busy due simply to buffer full (that is, it can't print data as fast as it can receive it), then data continues to be processed out of the buffer at approximately print speed and the real time commands will eventually get flushed out.

When the printer is busy due to an error condition, then data stops being processed to the buffer until the condition clears one way or another. In either case, but more quickly in the case of an error condition, the buffer can fill with real time commands.

When the DLE (0x10) sequences are being used, the last byte stored when the buffer fills up could be the DLE (0x10) code, with no room for the subsequent EOT or ENQ. When this lone DLE (0x10) byte is finally processed out of the buffer it will be interpreted as a clear printer command.

Similarly, when the GS (1D) sequences are being used, the last byte stored when the buffer fills up could be the GS (1D) code, with no room for the subsequent EOT or ETX or ENQ. When this lone GS (1D) byte is finally processed out of the buffer it will use the next byte, whatever it is, as the second byte in its GS (1D) sequence.

To guard against this situation, the application must determine the cause of a busy condition and take appropriate action or pace the real time commands to avoid filling the buffer. There is a minimum of 256 bytes available in the printer's buffer when it goes busy.

## Busy line and fault conditions

If the printer is in error condition (cover is open, paper is exhausted…), the printer will still accept data, respond to the batch mode status commands (1B 76 and 1B 75 0), handle the cash drawer commands, and not go busy until it actually tries to execute a print command. Then it will stay busy and stop processing data out of the receive buffer until the condition clears. It will respond to the real time commands as described on the next page.

## Real time status transmission

| | GS sequence | DLE sequence |
|---|---|---|
| **ASCII** | GS EOT *n* | DLE EOT *n* |
| **Hexadecimal** | 1D 04 *n* | 10 04 *n* |
| **Decimal** | 29 4 *n* | 16 4 *n* |

**Value of *n:*** GS/DLE sequence

1 = Transmit printer status
2 = Transmit RS-232C busy status
3 = Transmit error status
4 = Transmit receipt paper status

Transmits the selected one byte printer status specified by *n* in real time according to the following parameters. This command includes two sequences: GS (1D) and DLE (0x10).

### Exceptions

The command is ignored if *n* is out of range.

*Continued...*

An application using DLE (0x10) sequence must send EOT within 100 milliseconds of DLE or the printer will misinterpret the DLE and execute a clear printer command. Avoid this possibility by using the ID 04 *n* sequence, which is handled exactly the same as 10 04 *n*.

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A798 has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

**Related information**

**1 = Transmit printer status**

| Bit | Status | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Fixed to Off. |
| 1 | On | 02 | 2 | Fixed to On. |
| 2 | Off | 00 | 0 | One or both cash drawers open. |
| | On | 04 | 4 | Both cash drawers closed. |
| 3 | Off | 00 | 0 | Not busy at the RS-232C interface. |
| | On | 08 | 8 | Printer is busy at the RS-232C interface. |
| 4 | On | 10 | 16 | Fixed to on. |
| 5 | | | | Undefined. |
| 6 | | | | Undefined. |
| 7 | Off | 00 | 0 | Fixed to off. |

**2 = Transmit RS-232C Busy Status**

| Bit | Status | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Fixed to off. |
| 1 | On | 02 | 2 | Fixed to on. |
| 2 | Off | 00 | 0 | Cover closed. |
| | On | 04 | 4 | Cover open. |
| 3 | Off | 00 | 0 | Paper feed button is not pressed. |
| | On | 08 | 8 | Paper feed button is pressed. |
| 4 | On | 10 | 16 | Fixed to on. |
| 5 | Off | 00 | 0 | Printing not stopped due to paper condition. |
| | On | 20 | 32 | Printing stopped due to paper condition. |
| 6 | Off | 00 | 0 | No error condition. |
| | On | 40 | 64 | Error condition exists in the printer. |
| 7 | Off | 00 | 0 | Fixed to off. |

*Continued...*

**3 = Transmit error status**

| Bit | Status | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Fixed to off. |
| 1 | On | 02 | 2 | Fixed to on. |
| 2 | Off | 00 | 0 | Fixed to off. |
| 3 | Off | 00 | 0 | No knife error. |
| | On | 08 | 8 | Knife error occurred. |
| 4 | On | 10 | 16 | Fixed to on. |
| 5 | Off | 00 | 0 | No unrecoverable error. |
| | On | 20 | 32 | Unrecoverable error occurred. |
| 6 | Off | 00 | 0 | Thermal printhead temp. and power supply voltage are in range. |
| | On | 40 | 64 | Thermal print head temp. or power supply voltage are out of range. |
| 7 | Off | 00 | 0 | Fixed to off |

**4 = Transmit receipt paper status**

| Bit | Status | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Fixed to off |
| 1 | On | 02 | 2 | Fixed to on |
| 2 | Off | 00 | 0 | Paper adequate |
| | On | 04 | 4 | Paper low (if paper low sensor enabled) |
| 3 | Off | 00 | 0 | Paper adequate |
| | On | 08 | 8 | Paper low (if paper low sensor enabled) |
| 4 | On | 10 | 16 | Fixed to on |
| 5 | Off | 00 | 0 | Paper present |
| | On | 20 | 32 | Paper exhausted |
| 6 | Off | 00 | 0 | Paper present |
| | On | 40 | 64 | Paper exhausted |
| 7 | Off | 00 | 0 | Fixed to off |

### Real time request to printer

| | GS sequence | DLE sequence |
|---|---|---|
| **ASCII** | GS ETX *n* | DLE ENQ *n* |
| **Hexadecimal** | 1D 03 *n* | 10 05 *n* |
| | 29 3 *n* | 16 5 *n* |

**Value of *n*:** 1 = recover and restart
2 = recover and clear buffers

The printer responds to a request from the host specified by *n*. This command includes two sequences: GS and DLE. The operations performed depend on the value of *n*, according to the following parameters.

***n* = 1**

Restarts printing from the beginning of the line where an error occurred, after recovering from the error. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this command. This sequence is ignored except when the printer is busy due to an error condition.

This command will attempt recovery from a knife error. Other errors associated with the receipt, such as paper out or printhead overheating, can be recovered from only by clearing the specific condition, such as loading paper or letting the printhead cool down.

***n* = 2**

Recovers from an error after clearing the receive and print buffers. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this command. This sequence is ignored except when the printer is busy due to an error condition.

The same error recovery possibilities exist as for *n* = 1.

**Exceptions**

The command is ignored if *n* is out of range.

An application using DLE (0x10) sequence must send ENQ within 100 milliseconds of DLE or the printer will misinterpret the DLE and execute a clear printer command. Avoid this possibility by using the ID 03 *n* sequence, that is handled exactly the same as 10 05 *n*.

## Real time printer status transmission

**ASCII** GS ENQ
**Hexadecimal** 1D 05
**Decimal** 29 5

Transmits one byte status of the printer in real time.

**Value of byte:**

| Bit | Status | Hex | Decimal | Function |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Paper adequate. |
| | On | 01 | 1 | Paper low (if paper low sensor enabled). |
| 1 | Off | 00 | 0 | Paper adequate. |
| | On | 02 | 2 | Paper low (if paper low sensor enabled). |
| 2 | Off | 00 | 0 | Cover closed. |
| | On | 04 | 4 | Cover open. |
| 3 | Off | 00 | 0 | Not busy at the RS-232C interface. |
| | On | 08 | 8 | Printer is busy at the RS-232C interface. |
| 4 | Off | 00 | 0 | One or both cash drawers open. |
| | On | 10 | 16 | Both cash drawers closed. |
| 5 | Off | 00 | 0 | Fixed to off. |
| 6 | Off | 00 | 0 | No error condition. |
| | On | 40 | 64 | Error condition exists in the printer. |
| 7 | On | 80 | 128 | Fixed to on. |

**Exceptions**

Unlike the A793, that had a dedicated connector and resultant dedicated status reporting for each cash drawer, the A798 has a single connector that shares data reporting from either cash drawer. When either cash drawer is open, an open status is reported by the printer.

## Real time commands disabled

**ASCII** US z *n*
**Hexadecimal** 1F 7A *n*
**Decimal** 31 122 *n*

**Value of *n*:** 0 = enable
1 = disable

This command is used to disable real time commands. They are disabled prior to sending graphic or other data to the printer that may contain embedded real time commands.

This command is a batch command and processed in the order received.

## Unsolicited status mode

### Select or cancel unsolicited status mode (USM)

**ASCII:** GS a *n*
**Hexadecimal:** 1D 61 *n*
**Decimal:** 29 97 *n*

**Value of *n*:** 0 turns mode off; any non-zero value turns mode on

**Default:** 0 (USM disabled)

Enables or disables automatic return of 4 status bytes whenever one or more of the listed changes occurs. This command is a batch mode command; that is, it is processed after all prior data in the input buffer has been processed. There may be a time lag between the printer receiving this command and enabling unsolicited status mode (USM), depending on the pending input buffer contents.

If an immediate return of printer status is desired, then any of the other status commands should be issued following this command. Once this mode is activated, the printer automatically transmits 4 status bytes whenever any of the conditions change. If an RS-232C connection with hardware flow control is used, all four status bytes will be transmitted without checking DSR.

This command is a POS version of general printer unsolicited status functions; it uses the same command code as older versions of the POS command. “automatic status back (ASB)” but has the following differences:

- The parameter *n* is an on/off switch; it does not select trigger subset
- There is no immediate return when this mode is turned on
- All 4 status bytes are always returned

A change in any of the following conditions will trigger the USM response:

- Cash Drawer
- Receipt Cover
- Knife Error
- Out-of-Range Printhead Temperature
- Out-of-Range Voltage
- Paper Exhaust Status
- Slip Paper

**Related information**

When Unsolicited Status Mode is enabled using this command, the status transmitted by other commands and the USM status are differentiated according to the information found in Recognizing Data from the printer, which follows the USM return description.

The status bytes to be transmitted are described in the following four tables.

Byte 1 = printer information
Byte 2 = error information
Byte 3 = paper sensor information
Byte 4 = paper sensor information

*Continued...*

**First Byte (Printer Information)**

| Bit | Off/On | Hex | Decimal | Status for USM |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Not used. Fixed to off. |
| 1 | Off | 00 | 0 | Not used. Fixed to off. |
| 2 | Off | 00 | 0 | One or both cash drawers open. |
| | On | 04 | 4 | Both cash drawers closed. |
| 3 | Off | 00 | 0 | Not busy at the RS232C interface. |
| | On | 08 | 8 | Printer is busy at the RS232C interface. |
| 4 | On | 10 | 16 | Not used. Fixed to on. |
| 5 | Off | 00 | 0 | Receipt cover closed. |
| | On | 20 | 32 | Receipt cover open. |
| 6 | Off | 00 | 0 | Paper feed button is not pressed. |
| | On | 40 | 64 | Paper feed button is pressed. |
| 7 | Off | 00 | 0 | Not used. Fixed to off. |

**Second byte (error information)**

| Bit | Off/On | Hex | Decimal | Status for USM |
|---|---|---|---|---|
| 0 | – | – | – | Undefined |
| 1 | – | – | – | Undefined |
| 2 | Off | 00 | 0 | No mechanical error |
| | On | 04 | 4 | Mechnical error occurred |
| 3 | Off | 00 | 0 | No knife error. |
| | On | 08 | 8 | Knife error occurred. |
| 4 | Off | 00 | 0 | Not used. Fixed to off. |
| 5 | Off | 00 | 0 | No unrecoverable error. |
| | On | 20 | 32 | Unrecoverable error occurred. |
| 6 | Off | 00 | 0 | No recoverable error. |
| | On | 40 | 64 | Recoverable error: Cover open, paper out, temperature or voltage error is out of range. |
| 7 | Off | 00 | 0 | Not used. Fixed to off. |

*Continued...*

**Third byte (paper sensor information)**

| Bit | Off/On | Hex | Decimal | Status for USM |
|---|---|---|---|---|
| 0 | Off | 00 | 0 | Receipt paper adequate |
| | On | 01 | 1 | Receipt paper low (if paper low sensor enabled) |
| 1 | Off | 00 | 0 | Receipt paper present |
| | On | 02 | 2 | Receipt paper low (if paper low sensor enabled) |
| 2 | Off | 00 | 0 | Receipt paper present. |
| | On | 04 | 4 | Receipt paper exhausted. |
| 3 | Off | 00 | 0 | Receipt paper present. |
| | On | 08 | 8 | Receipt paper exhausted. |
| 4 | Off | 00 | 0 | Not used. Fixed to off. |
| 5 | – | – | – | Undefined |
| 6 | – | – | – | Undefined |
| 7 | Off | 00 | 0 | Not used. Fixed to off. |

**Fourth byte (paper sensor information)**

| Bit | Off/On | Hex | Decimal | Status for USM |
|---|---|---|---|---|
| 0 | – | – | – | Undefined |
| 1 | – | – | – | Undefined |
| 2 | – | – | – | Undefined |
| 3 | – | – | – | Undefined |
| 4 | Off | 00 | 0 | Not used. Fixed to off. |
| 5 | – | – | – | Undefined |
| 6 | – | – | – | Undefined |
| 7 | Off | 00 | 0 | Not used. Fixed to off. |

## Recognizing data from the printer

An application sending various real time and non-real time commands to which the printer responds can determine which command a response belongs to by the table below.

Responses to transmit peripheral device status (1B 75) and transmit paper sensor status (1B 76) are non-real time responses and will arrive in the order in which they were solicited.

| **Batch mode response** | | **Response recognized by:** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **ASCII** | **HEX** | | | | | | | | | |
| ECS u 0 | 1B 75 0 | 0 | 0 | 0 | 0 | 0 | 0 | x | x | Binary |
| ESC v | 1B 76 | 0 | x | x | 0 | 0 | x | x | x | Binary |
| GS I *n* | 1D 49 *n* | 0 | x | x | 0 | x | x | x | x | Binary |
| GS r *n* | 1D 72 *n* | 0 | x | x | 0 | x | x | x | x | Binary |
| **Real time response** | | **Response recognized by:** | | | | | | | | |
| **ASCII** | **HEX** | | | | | | | | | |
| GS EOT *n* | 1D 04 *n* | 0 | x | x | 1 | x | x | 1 | 0 | Binary |
| DLE EOT *n* | 10 04 *n* | 0 | x | x | 1 | x | x | 1 | 0 | Binary |
| GS ENQ | 1D 05 | 1 | x | x | x | x | x | x | x | Binary |
| XON | | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Binary |
| XOFF | | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | Binary |
| **Unsolicited status mode (USM)** | | **Response recognized by:** | | | | | | | | |
| USM Byte 1 | | 0 | x | x | 1 | x | x | 0 | 0 | Binary |
| USM Byte 2-4 | | 0 | x | x | 0 | x | x | x | x | Binary |

## Bar codes

These commands format and print bar codes and are described in order of their hexadecimal codes.

These commands describe operation for 80mm paper. If the printer supports 82.5mm paper, the dot spacing is the same but there are 640 printable dots rather than the 576 printable dots on 80mm paper.

### Select printing position of HRI characters

**ASCII** GS H *n*
**Hexadecimal** 1D 48 *n*
**Decimal** 29 72 *n*

**Value of *n*:** Printing position

0 = Not printed
1 = Above the bar code
2 = Below the bar code
3 = Both above and below the bar code

**Default:** 0 (Not printed)

Prints HRI (human readable interface) characters above or below the bar code.

### Select pitch of HRI characters

**ASCII** GS f *n*
**Hexadecimal** 1D 66 *n*
**Decimal** 29 102 *n*

**Value of *n*:** 0 = Standard Pitch at 15 CPI
1 = Compressed Pitch at 20 CPI

**Default:** 0 (Standard Pitch at 15 CPI)

Selects standard and compressed font for printing bar code characters.

### Select bar code height

**ASCII** GS h *n*
**Hexadecimal** 1D 68 *n*
**Decimal** 29 104 *n*

**Value of *n*:** Number of dots

**Range of *n*:** 1–255

**Default:** 216

Sets the bar code height to (*n*/154 inch).

## Print bar code

| | First Variation | Second Variation |
|---|---|---|
| **ASCII** | GS k *m d1…dk* NUL | GS k *m n d1…dn* |
| **Hexadecimal** | 1D 6B *m d1…dk* 00 | 1D 6B *m n d1…dn* |
| **Decimal** | 29 107 *m d1 dk* 0 | 29 107 *m n d1…dn* |
| | (0 = End of command) | |

Selects the bar code type and prints a bar code for the ASCII characters entered. If the width of the bar code exceeds one line, the bar code is not printed.

There are two variations to this command. The first variation uses a NUL character to terminate the string; the second uses a length byte at the beginning of the string to compensate for the code 128 bar code, which can accept a NUL character as part of the data. With the second variation, the length of byte is specified at the beginning of the string.

Bar codes can be aligned left, center, or right using the align positions command (1B 61).

The check digit is calculated for UPC and JAN (EAN) codes if it is not sent from the host computer. Six-character zero-suppressed UPC-E tags are generated from full 11 or 12 characters sent from the host computer according to standard UPC-E rules. Start/stop characters are added for code 39 if they are not included.

Rotated barcodes set with small modules (select bar code width command 1D 77 n , with n=1 or 2) and PDF 417 barcodes in any orientation are printed at low speed, for better readability.

**Exceptions**

The command is only valid at the beginning of a line.

Illegal data cancels the command.

**Values:**

First variation: String terminated with NUL character. Length *k* is not specified in command string; it depends on the bar code being printed.

| ***m*** | **Bar code** | ***d1...dk*** | **length** |
|---|---|---|---|
| 0 | UPC-A | 48–57 (ASCII numerals) | Fixed length: 11, 12 |
| 1 | UPC-E | 48–57 | Fixed length: 11, 12 |
| 2 | JAN13 (EAN) | 48–57 | Fixed length: 12, 13 |
| 3 | JAN8 (EAN) | 48–57 | Fixed length: 7, 8 |
| 4 | Code 39 | 48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) *d1* = *dk* = 42 (start/stop code is supplied by printer if necessary) | Variable length |
| 5 | Interleaved 2 of 5 | 48–57 | Variable length (even number) |
| 6 | Codabar | 65–68, start code 48–57, 36, 43, 45, 46, 47, 58 | Variable length |
| 10 | PDF 417 | 32–255 | Variable length |

Second variation: length *n* specified at beginning of string. Except as noted, 0 < *n* < 256.

| *m* | Bar code | *d1...dn* | *n* |
|---|---|---|---|
| 65 | UPC-A | 48–57 (ASCII numerals) | Fixed length: 11, 12 |
| 66 | UPC-E | 48–57 | Fixed length: 11, 12 |
| 67 | JAN13 (EAN) | 48–57 | Fixed length: 12, 13 |
| 68 | JAN8 (EAN) | 48–57 | Fixed length: 7, 8 |
| 69 | CODE39 | 48–57, 65–90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters)<br>*d1* = *dk* = 42 (start/stop code is supplied by printer if necessary) | Variable |
| 70 | Interleaved 2 of 5 (ITF) | 48–57 | Variable (even number) |
| 71 | CODABAR (NW-7) | 65–68, start code 48- 57, 36, 43, 45, 46, 47, 58 | Variable |
| 72 | Code 93 | 00–127 | Variable |
| 73 | Code 128 | 0–105 *d1* = 103-105 (must be a start code)<br>*d2* = 0–102 (data bytes) (Stop code is provided by the printer) | Variable |
| 74 | Code 128 auto compress | 0–255<br>00–FF | Variable |
| 75 | PDF 417 | 0–255<br>00–FF | Variable |
| 78 | Code EAN 128 auto compress | 0–255<br>00–FF | Variable |
| 79 | PDF 417 | 0–255<br>00–FF<br>data length specified via integer<br>*n* = *n*H:*n*L 1D 6B *m* *n*L *n*H *d*1. . .*dn* | Variable<br>0 < *n* < 2800 |

The value of *m* selects the bar code system as described in the table. The variable *d* indicates the character code to be encoded into the specified bar code system. See the table. If character code *d* cannot be encoded, the printer prints the bar code data processed so far, and the following data is treated as normal data.

**Exceptions**

Code 93 and PDF 417 are only available in A798 native mode.

## Print multiple barcodes

**ASCII** GS
**Hexadecimal** 1D 6B FF n
**Decimal** 29/108

All the individual barcode strings start with 1D 6B m, where m is the type of barcode. Use the same command to do multiple barcodes on one line.

1D 6B FF 01 begin multiple barcodes one line

1D 6B FF 00 end multiple barcodes one line, print the barcodes

- Multiple barcodes can be aligned right, left, center same as single line barcodes
- All barcodes on one line printed at same alignment, height, width, and HRI as the first one

- Parameters for alignment, height, width, and HRI can be set before or after 1D 6B FF 01 command
- No height restriction change from single line barcodes
- Quiet zone between barcodes = 10 * module width
- No text in between barcodes (results undefined)
- Upright, picket fence barcodes only, no upside down or ladder. Extended barcode printing for upside down and ladder barcodes can be done in page mode if required.
- Slip/validation selection disabled in multiple barcodes command string
- Multiple barcodes command string disabled when slip/validation selected
- Page mode disabled in multiple barcodes command string
- Multiple barcodes command string disabled in page mode
- Page mode parameters initialized at end of multiple barcodes command string

Sample multiple barcodes command string:

| | |
|---|---|
| 1b 40 | Initialize |
| 1d 6b ff 01 | Begin multiple barcodes one line |
| 1b 61 01 | Center align |
| 1d 68 40 | Barcode height |
| 1d 77 02 | Barcode width |
| 1d 48 02 | Print HRI below |
| 1d 6b 49 06 67 27 2d 2e 2d 2e | Barcode 1, code 128 |

### Set GS1 DataBar (formerly RSS) parameters

**ASCII** GS q a b c d e fL fH
**Hexadecimal** 1D 71 a b c d e fL fH
**Decimal** 29 113 a b c d e fL fH

| | | |
|---|---|---|
| a | byte | pixels per minimum unit, default 3, minimum 2, maximum 6 (value a applies to parameters b, c, d) |
| b | byte | X undercut, default 0, can be set 0 to a-1 |
| c | byte | Y undercut, default 0, can be set 0 to a-1 |
| d | byte | separator height, default a, can be set a to a*2 |
| e | byte | segment width, used only by GS1 Expanded, default 22, must be even number 2 to 22 |
| f | word | line height, used only by UCC128, default 25, can be set 1 to 500 |

*Note:* For GS1 DataBar commands, consult ISO/IEC 24721. For futher information, visit www.gs1.org.

**Print GS1 DataBar (formerly RSS), null terminated**

**ASCII** GS k n d1... 00
**Hexadecimal** 1D 6B n d1... 00
**Decimal** 29 107 n d1... 00

| *n* | Type |
|---|---|
| 51 | GS1 databar |
| 52 | GS1 databar truncated |
| 53 | GS1 databar stacked |
| 54 | GS1 databar stacked omni-directional |
| 55 | GS1 databar limited |
| 56 | GS1 databar expanded and expanded stacked |
| 57 | UPC-A |
| 58 | UPC-E |
| 59 | EAN-13 |
| 5A | EAN-8 |
| 5B | UCC/EAN-128 with CC-A or CC-B |
| 5C | UCC/EAN-128 with CC-C |

*Note*: Null terminated, data length 1 to 2436

**Print GS1 DataBar (formerly RSS), data length specified**

**ASCII** GS k m nL nH d1... dn
**Hexadecimal** 1D 6B m nL nH d1... dn
**Decimal** 29 107 m nL nH d1... dn

| *m* | Type |
|---|---|
| 61 | GS1 databar |
| 62 | GS1 databar truncated |
| 63 | GS1 databar stacked |
| 64 | GS1 databar stacked omni-directional |
| 65 | GS1 databar limited |
| 66 | GS1 databar expanded and expanded stacked |
| 67 | UPC-A |
| 68 | UPC-E |
| 69 | EAN-13 |
| 6A | EAN-8 |
| 6B | UCC/EAN-128 with CC-A or CC-B |
| 6C | UCC/EAN-128 with CC-C |

*Note*: Data length specified 1 to 2436 via integer nH : nL.

### Select PDF 417 parameters

**ASCII** GS p a b c d e f
**Hexadecimal** 1D 70 a b c d e f
**Decimal** 29 112 a b c d e f

**Value and Ranges:**

| Value: | | Ranges: | Description: |
|---|---|---|---|
| a, b = | | | The ratio of bar height to symbol length. |
| a = height | | limit 1 to 10 | |
| b = width | | limit 1 to 100 | |
| c = | rows | limit 3 to 90 | Number of rows in the matrix of code words. |
| d = | columns | limit 7 to 30 | Number of columns in the matrix of code words. |
| e = | x dimension | limit 1 to 7 | Width of a single module in dots. |
| f = | y dimension | limit 2 to 25 | Height of the code word in dots. |

**Defaults:**
a = 1
b = 2
c = 58
d = 7
e = 3
f = 10

PDF 417 is a multi-row, continuous, variable length symbology which has high data capacity. Each symbol has between 3 and 90 rows, with each row containing a start pattern, a left row indicator, 1 to 30 data characters, a right row indicator and a stop pattern. The number and length of the rows are selectable, which allows the aspect ratio to be adjusted to particular labeling applications. There are no separator bars between rows.

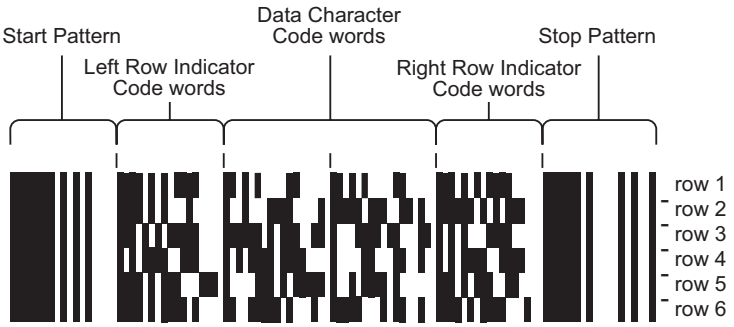
Each character has four bars and four spaces within 17 modules, and is assigned a value between 0 and 928. For this symbology, it is common to refer to these character values as “code words.”

There are three mutually exclusive sets of symbol patterns, or clusters, each having 929 distinct patterns. Because different clusters are used for adjacent rows, it is possible for the decoder to tell if the scanning path is crossing row boundaries without the use of separator bars.

**Sample symbol description:**

Each PDF 417 symbol consists of 3 to 90 stacked rows surrounded on all four sides by a quiet zone. Each row contains:

**1** Leading quiet zone
**2** Start pattern
**3** Left row indicator characters (code words)
**4** One to thirty data characters (code words)
**5** Right row indicator character (code words)
**6** Stop pattern
**7** Trailing quiet zone




The number of characters in a row and number of rows can be adjusted to vary the symbol's overall aspect ratio to best fit an available space.

Each row has a left and right row indicator with a data region between. The left-most character in the top row of the data region is the total number of characters in the data region, excluding error correction characters. Characters within the data region are designed to be read from left to right, starting on the top row, immediately after the length-defining character. The maximum characters in the data region are 928.

**Related Information:**

The "Set bar code width" command (1D 77 n) affects the x dimension and row height for PDF 417. See chart below.

| n value | x dimension | row height |
|---|---|---|
| 2 | 2 | 7 |
| 3 | 3 | 10 |
| 4 | 4 | 13 |
| 5 | 5 | 17 |
| 6 | 6 | 20 |

## Select bar code width

**ASCII** GS w *n*
**Hexadecimal** 1D 77 *n*
**Decimal** 29 119 *n*

**Value of *n*:** 2, 3, 4, 5, 6

**Default:** n=3

Sets the bar code width to *n* dots.

**Formulas**

*n*/8mm (*n*/203 inch)

## Page mode

Page mode is one of two modes that the A798 printer uses to operate. Standard mode is typical of how most printers operate by printing data as it is received and feeding paper as the various paper feed commands are received. Page mode is different in that it processes or prepares the data as a "page" in memory before it prints it. Think of this as a virtual page. The page can be any area within certain parameters that you define. The page is printed using either the FF (0C) or the ESC FF (1B 0C) command.

The select page mode command (1B 4C) puts the printer into page mode. Any commands that are received are interpreted as page mode commands. Several commands react differently when in standard mode and page mode. The descriptions of these individual commands in this chapter indicate the differences in how they operate in the two modes.

These commands describe the operation for 80mm paper. If the printer supports 82.5mm paper, the dot spacing is the same but there are 640 printable dots rather than 576 printable dots on 80mm paper.

### Print and return to standard mode

**ASCII** FF
**Hexadecimal** 0C
**Decimal** 12

When printing is completed, values for select print direction in page mode (1B 54*n*) and set print area in page mode (1B 57 *n*1, *n*2, …*n*8) and the position for buffering character data are set. Buffered data is not deleted from the printer.

The processed data is printed and the printer returns to standard mode. The developed data is deleted after being printed. For more information see page mode in this document.

**Exceptions**

This command is enabled only in page mode.

### Cancel print data in page mode

**ASCII** CAN
**Hexadecimal** 18
**Decimal** 24

Deletes all the data to be printed in the "page" area. Any data from the previously selected "page" area that is also part of the current data to be printed is deleted.

**Exceptions**

This command is only used in page mode.

### Print data in page mode

**ASCII** ESC FF
**Hexadecimal** 1B 0C
**Decimal** 27 12

Collectively prints all buffered data in the printing area.

After printing, the printer does not clear the buffered data and sets values for select print direction in page mode (1B 54 *n*) and set print area in page mode (1B 57 …), and sets the position for buffering character data.

**Exceptions**

This command is enabled only in page mode.

### Select page mode

**ASCII** ESC L
**Hexadecimal** 1B 4C
**Decimal** 27 76

Switches from standard mode to page mode. After printing has been completed either by the print and return to standard mode (FF) command or select standard mode (1B 53) the printer returns to standard mode. The developed data is deleted after being printed. For more information see page mode in this document.

This command sets the position where data is buffered to the position specified by select print direction in page mode (1B 54) within the printing area defined by set print area in page mode (1B 57).

This command switches the settings for the following commands (which values can be set independently in standard mode and page mode) to those for page mode.

- Set right-side character spacing (1B 20)
- Select 1/6-inch line spacing (1B 32)
- Set line spacing (1B 33)

It is possible only to set values for the following commands in page mode. These commands are not executed.

- Select or cancel 90 degree clockwise rotation (1B 56)
- Set counter-clockwise rotation (1B 12)
- Select justification (1B 61)
- Select or cancel upside-down printing (1B 7B)
- Set left margin (1D 4C)
- Set print area width (1D 57)

#### Exceptions

The command is enabled only when input at the beginning of a line.

The command has no effect if page mode has previously been selected.

## Select standard mode

**ASCII** ESC S
**Hexadecimal** 1B 53
**Decimal** 27 83

Switches from page mode to standard mode. In switching from page mode to standard mode, data buffered in page mode are cleared, the printing area set by set print area in page mode (1B 57) is initialized and the print position is set to the beginning of the line.

This command switches the settings for the following commands (the values for these commands can be set independently in standard mode and page mode) to those for standard mode:

- Set right-side character spacing (1B 20)
- Select 1/6 inch line spacing (1B 32)
- Set line spacing (1B 33)

Standard mode is automatically selected when power is turned on, the printer is reset, or the initialize printer command (1B 40) is used.

**Exceptions**

This command is effective only in page mode.

## Select print direction in page mode

**ASCII** ESC T *n*
**Hexadecimal** 1B 54 *n*
**Decimal** 27 84 *n*

**Value of *n*:** Start position

0 = Upper left corner proceeding across page to the right
1 = Lower left corner proceeding up the page
2 = Lower right corner proceeding across page to the left (upside down)
3 = Upper right corner proceeding down page

**Default:** 0

Selects the printing direction and start position in page mode. See the illustration in previous column.

The command can be sent multiple times so that several different print areas, aligned in different print directions, can be developed in the printer's page buffer before being printed using the print page mode commands (0C or 1B 0C).

**Exceptions**

The command is valid only in page mode.

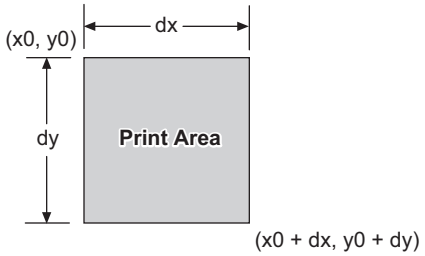
The command is ignored if the value of *n* is out of the specified range.

## Set print area in page mode

**ASCII** ESC W *n1, n2 ...n8*
**Hexadecimal** 1B 57 *n1, n2 ...n8*
**Decimal** 27 87 *n1, n2 ...n8*

**Range of *n:*** 0-255

**Default:** *n1-4* = 0
*n5* = 64
*n6* = 2
*n7* = 64
*n8* = 2




Sets the position and size of the printing area in page mode.

The command can be sent multiple times so that several different print areas, aligned in different print directions, can be developed in the printer's page buffer before being printed using the print page mode commands (0C or B 0C).

### Formulas

The starting position of the print area is the upper left of the area to be printed (x0, y0). The length of the area to be printed in the y direction is set to dy inches. The length of the area to be printed in the x direction is set to dx inches. Use the equations to determine the Value of x0, y0, dx, and dy.

- x0 = [(*n*1 + *n*2 x 256) x (horizontal direction of the fundamental calculation pitch)]
- y0 = [(*n*3 + *n*4 x 256) x (vertical direction of the fundamental calculation pitch)]
- dx = [(*n*5 + *n*6 x 256) x (horizontal direction of the fundamental calculation pitch)]
- dy = [(*n*7 + *n*8 x 256) x (vertical direction of the fundamental calculation pitch)]

Keep the following notes in mind for this command.

- The fundamental calculation pitch depends on the vertical or horizontal direction.
- The maximum printable area in the x direction is 576/203 inches.
- The maximum printable area in the y direction is 576/203 inches.

See the illustration for a graphic representation of the printing area. For more information about the fundamental calculation pitch, see the set horizontal and vertical motion units command (1D 50).

### Maximum area specification in page mode

Maximizing the possible area in page mode consumes almost all of the free RAM. Without any free RAM, bitmap rotations and enlargements cannot be performed. Use the User Storage Status command (1D 97 *m n*) to determine the amount of free memory.

### Exceptions

The command is effective only in page mode.

## Set absolute vertical print position in page mode

**ASCII** GS $ *nL nH*
**Hexadecimal** 1D 24 *nL nH*
**Decimal** 29 36 *nL nH*

Sets the absolute vertical print starting position for buffer character data in page mode. The absolute print position is set to [(*nL* + *nH* X 256) x (vertical or horizontal motion unit)] inches.

The vertical or horizontal motion unit for the paper roll is used and the horizontal starting buffer position does not move.

The reference starting position is set by select print direction in page mode (1B 54). This sets the absolute position in the vertical direction when the starting position is set to the upper left or lower right; and sets the absolute position in the horizontal when the starting position is set to the upper right or lower left. The horizontal and vertical motion unit are specified by the set horizontal and vertical minimum motion units (1D 50) command.

The set horizontal and vertical minimum motion units (1D 50) command can be used to change the horizontal and vertical motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

**Formulas**

[(*nL* + *nH* X 256) x (vertical or horizontal motion unit)] inches.

**Exceptions**

This command is effective only in page mode.

If the [(*nL* + *nH* X 256) x (vertical or horizontal motion unit)] exceeds the specified printing area, this command is ignored.

## Set relative vertical print position in page mode

**ASCII** GS \ *nL nH*
**Hexadecimal** 1D 5C *nL nH*
**Decimal** 29 92 *nL nH*

**Value**

The value for the horizontal and vertical movement cannot be less than the minimum horizontal movement amount, and must be in even units of the minimum horizontal movement amount.

Sets the relative vertical print starting position from the current position. This command can also change the horizontal and vertical motion unit. The unit of horizontal and vertical motion is specified by this command.

This command functions as follows, depending on the print starting position set by select print direction in page mode (1B 54):

When the starting position is set to the upper right or lower left of the printing area, the vertical motion unit (*y*) is used. When the starting position is set to the upper left or lower right of the printing area, the horizontal motion unit (*x)* is used.

**Formulas**

The distance from the current position is set to [(*nL* + *nH* x 256) x vertical or horizontal motion unit] inches. The amount of movement is calculated only for the paper roll.

When pitch *n* is specified to the movement downward: *nL* + *nH* x 256 = *n*

When pitch *n* is specified to the movement upward (the negative direction), use the complement of 65536.

When pitch *n* is specified to the movement upward: *nL* + *nH* x 256 – 65536 – *N*

**Exceptions**

This command is used only in page mode, otherwise it is ignored.

Any setting that exceeds the specified printing area is ignored.

## Macros

These commands are used to select and perform a user-defined sequence of printer operations.

### Select or cancel macro definition

**ASCII** GS :
**Hexadecimal** 1D 3A
**Decimal** 29 58

Starts or ends macro definition. Macro definition begins when this command is received during normal operation and ends when this command is received during macro definition. The macro definition is cleared, during definition of the macro when the execute macro (1D 5E) command is received.

Normal printing occurs while the macro is defined. When the power is turned on the macro is not defined.

The defined contents of the macro are not cleared by the initialize printer (1B 40), thus, the initialize printer (1B 40) command may be used as part of the macro definition.

If the printer receives a second select or cancel macro definition (1D 3A) command immediately after previously receiving a select or cancel macro definition (1D 3A) the printer remains in the macro undefined state.

**Formulas**

The contents of the macro can be defined up to 2048 bytes.

**Exceptions**

If the macro definition exceeds 2048 bytes, excess data is not stored.

### Execute macro

**ASCII** GS ^ *r t m*
**Hexadecimal** 1D 5E *r t m*
**Decimal** 29 94 *r t m*

**Value of *r:*** The number of times to execute the macro.

**Value of *t:*** The waiting time for executing the macro.

Executes a macro. After waiting for a specified period the printer waits for the paper feed button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats this operation the number of specified times.

When the macro is executed by pressing the paper feed button ($m$ = 1), paper cannot be fed by using the paper feed button.

**Formulas**

The waiting time is $t$ x 100 ms for every macro execution.

$m$ specifies macro executing mode when the LSB (least significant bit) $m$ = 0

The macro executes $r$ times continuously at the interval specified by $t$ when the LSB (least significant bit) of $m$ = 1.

**Exceptions**

If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.

If the macro is not defined or if $r$ is 0, nothing is executed.

## User data storage

### Write to user data storage

**ASCII** ESC ' *m a0 a1 a2 d1 ... dm*
**Hexadecimal** 1B 27 *m a0 a1 a2 d1 ... dm*
**Decimal** 27 39 *m a0 a1 a2 d1 ... dm*

**Value of *m*:** 0 – 255

Writes *m* bytes of data to the user data storage flash page at the address specified. The printer waits for *m* bytes of data following the 3-byte address, *addr*.

If any of the memory locations addressed by this command are not currently erased, the command is not executed.

**Related information**

Result of this write is returned in bit 2 of response to transmit status command 1D 72, *n* = 4.

### Read from user data storage

**ASCII** ESC 4 *m a0 a1 a2*
**Hexadecimal** 1B 34 *m a0 a1 a2*
**Decimal** 27 52 *m a0 a1 a2*

**Value of *m*:** 0 – 255

Reads *m* bytes of data from the user data storage flash page at the address specified.

### Read from non-volatile memory (NVRAM)

**ASCII** ESC j *k*
**Hexadecimal** 1B 6A *k*
**Decimal** 27 106 *k*

**Range of *k*:** 20 – 63 (decimal)

Reads a two-byte word from location *k* in the history EEROM. The printer returns the word at the next available opportunity.

**Related information:**

This is ignored in LEGACY emulation and the parameter byte goes into the print buffer.

### Write to non-volatile memory (NVRAM)

**ASCII** ESC s *n*1 *n*2 *k*
**Hexadecimal** 1B 73 *n*1 *n*2 *k*
**Decimal** 27 115 *n*1 *n*2 *k*

**Value of *n1*:** 1st Byte

**Value of *n2*:** 2nd Byte

**Range of *k*:** 20 – 63 (decimal locations)

Writes the two-byte word, *n*1 *n*2, to location *k* in history EEROM.

**Related information:**

This is ignored in LEGACY emulation and the parameter bytes go into the print buffer.

### Select memory type (SRAM/flash) where to save logos or user-defined fonts

**ASCII** GS " *n*
**Hexadecimal** 1D 22 *n*
**Decimal** 29 34 *n*

**Value of *n*:** 48 – 53

***n* = 48 (ASCII *n* = 0) HEX 30**

Loads active logo to RAM only. This is used to print a special logo but not have it take up flash memory. A logo defined following this command is not preserved over a power cycle. The printer disables interrupts while writing to flash. Any command that cause data to be written to flash should be followed by a 50 Msec delay to allow significant time for the write operation.

***n* = 49 (ASCII *n* = 1) HEX 31**

Loads active logo to flash memory. This is the default condition for logo flash storage. A logo defined following this command is stored in flash memory.

***n* = 50 (ASCII *n* = 2) HEX 32**

Loads user-defined characters to RAM only. This is the default condition for user-defined character storage. Any user-defined characters defined following this command are not preserved over a power cycle.

***n* = 51 (ASCII *n* = 3) HEX 33**

Loads user-defined characters to flash memory. An application must use this command to store user-defined characters in flash memory. Any user-defined characters defined following this command are stored in flash memory. A user-defined character cannot be redefined in flash memory. The flash memory page must be erased by an application before redefining user-defined characters. For more information, see the erase user flash sector (1D 40 *n*) command.

Specifies whether to load the logos or user-defined characters to flash memory or to RAM (volatile memory). The selection remains in effect until it is changed via this command or until the power cycles. To specify permanent font flash are, also send 1D22 81 01.

**Related information**

This command is recognized in A798 native mode. In A793 and LEGACY emulations, parameter bytes go into the print buffer.

### Flash memory user sectors allocation

**ASCII** GS " U *n1 n*
**Hexadecimal** 1D 22 55 *n1 n2*
**Decimal** 29 34 85 *n1 n2*

**Default Value of *n1*:** 1 (see below)

**Default Value of *n2*:** 1 (see below)

*n*1 is the number of 64k sectors used for logos and user-defined characters.

*n*2 is the number of 64k sectors used for user data storage.

*n*1 + *n*2 <= 6 (dec) (1M)
*n*1 + *n*2 <= 22 (dec) 16 (hex) (2M)

If *n*1 + *n*2 is greater than the maximum number of sectors available, the command is ignored. The printer returns NACK.

Issuing this command with parameters different from current parameters will erase all sectors. The printer returns ACK.

Issuing this command with parameters the same as current parameters will do nothing. The printer returns ACK.

***Note:*** *Flash memory is made up of user and program code. Therefore, the available flash memory space will vary with the amount of program code utilized.*

## Expanded flash memory allocation

**ASCII** GS " 0x80
**Hexadecimal** 1D 22 80
**Decimal** 29 34 128

This sequence of commands is used to specify the number of flash sectors to be used for different applications. The begin and end sequence commands must be sent. All areas do not need to have flash sectors specified.

The command to request the number of user sectors is optional.

If more sectors are specified than are available the command sequence is ignored and the printer returns NACK.

If the sectors are available, and different from current parameters, all sectors are erased and the printer returns ACK.

If the sectors specified are the same as current parameters, nothing is erased and the printer returns ACK.

| | |
|---|---|
| 1D 22 80 00 | request number of user sectors available, printer returns nL nH |
| 1D 22 80 30 | begin expanded flash memory allocation sequence |
| 1D 22 80 31 nL nH | n sectors to logo/font area |
| 1D 22 80 32 nL nH | n sectors to user data storage area |
| 1D 22 80 33 nL nH | n sectors to permanent font area |
| 1D 22 80 34 nL nH | n sectors to electronic journal area |
| 1D 22 80 40 | end expanded flash memory allocation sequence |

n = 0xFFFF means allocate all remaining sectors to this area; only one area can specify this parameter value.

## Select flash area for storing logos and fonts

**ASCII** GS" 0x81
**Hexadecimal** 1D 22 81 *n*
**Decimal** 29 34 129 *n*

| **Value of *n*:** | *n* specifies |
|---|---|
| *n* = 0 | select logo/font area |
| *n* = 1 | select permanent font flash area |
| *n* > 1 | reserved. |

### Erase user flash sector

**ASCII** GS @ *n*
**Hexadecimal** 1D 40 *n*
**Decimal** 29 64 *n*

**Value of *n*:** 49 – 51

***n* = 49 (ASCII *n* = 1) HEX 31**

This command erases all 64K flash memory sectors allocated to user-defined character and logos storage. Those sectors should be erased in two situations: when the logo definition area is full and an application is attempting to define new logos, and when an application wants to replace one user-defined character set with another. In both cases, all logos and character set definitions are erased and must be redefined.

***n* = 50 (ASCII *n* = 2) HEX 32**

This command erases all sectors available for user data storage.

***n* = 51 (ASCII *n* = 3) HEX 33**

This command uses all sectors available for permanent fonts.

Erases a page of flash memory and sends a carriage return when the operation is complete.

**Related information**

See command “Flash memory user sectors allocation” (1D 22 55 n1 n2).
See also command “Expand flash memory allocation” (1D 22 80...).

***Important:*** *While erasing flash memory, the printer disables all interrupts, including communications. To provide feedback to the application, the printer responds to the application when the erase is complete. After sending the erase user flash sector (1D 40 n) command, an application should wait for the response from the printer before sending data. Otherwise, data will be lost. If an application is unable to receive data, it should wait a minimum of ten seconds after sending the erase user flash sector (1D 40 n) command before sending data.*

## Flash download

These commands are used to load firmware into the printer.

The commands are listed in numerical order according to their hexadecimal codes. Each command is described and the hexadecimal, decimal, and ASCII codes are listed.

There are three ways to enter the download mode.

1. Powering the printer up with DIP Switch 1 down.
2. While the printer is running normally, send the command, “Switch to flash download mode” (1B 5B 7D) to leave normal operation and enter the download mode.
3. If the flash if found corrupted during level 0 diagnostics the download mode is automatically entered after the printer has reset.

The printer never goes directly from the download mode to normal printer operation. To return to normal printer operation either the operator must turn the power off and then on to reboot or the application must send a command to cancel download mode and reboot. **DIP switch 1 must in UP position during reboot to return to normal printer operation.**

When each flash download command is received, the printer returns either ACK or NAK to the host computer when each command is received:

- ACK (hexadecimal 06)
  Sent when the printer has received a host transmission and has completed the request successfully.
- NAK (hexadecimal 15)
  Sent when a request is unsuccessful.

Communicates to the printer information downloaded from applications. Data is downloaded to flash memory to query the state of the firmware, calculate the firmware CRC and other functions.

### Switch to flash download mode

**ASCII** ESC [ }
**Hexadecimal** 1B 5B 7D
**Decimal** 27 91 125

Puts the printer in flash download mode in preparation to receive commands controlling the downloading of objects into flash memory. When this command is received, the printer leaves normal operation and can no longer print transactions until the reboot the printer command (1D FF) is received or the printer is rebooted.

This command does not affect the current communication parameters. Once the printer is in flash download mode, this command is no longer available.

#### Related information

See entering flash download mode elsewhere in this book to put the printer in flash download mode using the configuration menu.

### Return boot sector firmware part number

**ASCII** GS NULL
**Hexadecimal** 1D 00
**Decimal** 29 0

Returns ACK (Hex 06) + 12 bytes ASCII string describing the flash memory boot sector firmware part number.
Ex : 189-1234567A

#### Exceptions

Available only in download mode.

### Return segment number status of flash memory

**ASCII** GS SOH
**Hexadecimal** 1D 01
**Decimal** 29 1

Returns the size of the flash used. There may be 16 (1 Meg) or 32 (2 Meg) sectors in flash memory. This command assures that the firmware to be downloaded is the appropriate size for flash memory. The value returned is the maximum sector number that can be accepted by the select sector to download (1D 02 *nn*) command.

**Exceptions**

Available only in download mode.

### Select flash memory sector to download

**ASCII** GS STX *nn*
**Hexadecimal** 1D 02 *nn*
**Decimal** 29 2 *nn*

**Value of *n:*** The flash sector to which the next download operation applies

**Range of *n:*** 0

Selects the flash sector (*nn*) for which the next download operation applies. The values of the possible sector are restricted, depending upon the flash part type. The printer transmits an ACK if the sector number is acceptable or an NAK if the sector number is not acceptable. Sector numbers start at 0.

**Exceptions**

Available only in download mode.

### Get firmware CRC

**ASCII** GS ACK
**Hexadecimal** 1D 06
**Decimal** 29 6

Causes the printer to calculate the CRC for the currently selected sector and transmits the result. This is performed normally after downloading a sector to verify that the downloaded firmware is correct. The printer also calculates the CRC for each sector during power up and halts the program if any sector is erroneous.

The printer transmits ACK if the calculated CRC is correct for the selected sector; NAK if the CRC is incorrect or if no sector is selected.

### Return microprocessor CRC

**ASCII** GS BEL
**Hexadecimal** 1D 07
**Decimal** 29 7

Returns the CRC calculated over the boot sector code space.

**Formulas**

ACK <low byte> <high byte>

### Erase all flash contents except boot sector

**ASCII** GS SO
**Hexadecimal** 1D 0E
**Decimal** 29 14

Causes the entire flash memory to be erased.

The printer returns ACK if the command is successful; NAK if it is unsuccessful.

**Exceptions**

Available only in download mode.

### Return main program flash CRC

**ASCII** GS SI
**Hexadecimal** 1D 0F
**Decimal** 29 15

Returns the CRC calculated over the flash firmware code space.

The format of the response is ACK <low byte> <high byte>.

### Erase selected flash sector

**ASCII** GS DLE *n*
**Hexadecimal** 1D 10 *n*
**Decimal** 29 16 *n*

**Value and range of *n:*** 0–7 = 512k bytes flash
0–15 = 1M bytes flash
0–31 = 2M bytes flash

Erases the previously selected sector. The printer transmits ACK when the sector has been erased. If the previous sector is not successfully erased, or if no sector was selected, the printer transmits NAK.

#### Exceptions

Available only in download mode.

### Download to active flash sector

**ASCII** GS DC1 *aL aH cL cH d1… dn*
**Hexadecimal** 1D 11 *aL aH cL cH d1… dn*
**Decimal** 29 17 *aL aH cL cH d1… dn*

**Value of *aL:*** low byte of the address

**Value of *aH:*** high byte of the address

**Value of *cL:*** low byte of the count

**Value of *cH:*** high byte of the count

**Value of *d:*** data bytes, 0–255

| Value of *n* (for number of data bytes) | Range of address (*aL aH*) | Range of count (*cL cH*) |
|---|---|---|
| **((*cH* * 256) + *cL*)** | **0000–FFFF (hexadecimal)** | **0001–FFFF (hexadecimal)** |

**Range:** Addresses run from 0 to 64K.

Contains a start address (aH x 256 + aL) and count (cH x 256 + cL) of binary bytes to load into the selected sector, followed by that many bytes. The start address is relative to the start of the sector. Addresses run from 0 to 64K.

The count must always be 256.

The printer may return one of several responses. ACK means that the data was written correctly and the host should transmit the next block. NAK means that, for some reason, the data was not written correctly. This could mean that communications failed or that the write to flash failed. The alternatives seem to be to retry the block or halt loading and assume a hardware failure.

#### Related information

Available only in download mode.

### Reset firmware

**ASCII** GS (SPACE)
**Hexadecimal** 1D FF
**Decimal** 29 255

Ends the load process and reboots the printer. Before executing this command, the printer should have firmware loaded and external switches set to the runtime settings. Application software for downloading should prompt the user to set the external switches and confirm before sending this command. If the downloading was started from a diagnostic, the reboot will cause the printer to re-enter download state unless the external switches are changed.

# Appendix A:
# Commands listed by hexadecimal code

## By command code

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 09 | Horizontal tab | 42 |
| 0A | Print and feed paper one line | 39 |
| 0C | Print and return to standard mode | 90 |
| 0D | Print and carriage return | 39 |
| 10 | Clear printer | 34 |
| 10 04 *n* | Real time status transmission (DLE sequence) | 74 |
| 10 05 *n* | Real time request to printer (DLE sequence) | 77 |
| 11 *n1 .. n72* | Print Raster Graphics | 65 |
| 12 | Select double-wide characters | 48 |
| 13 | Select single-wide characters | 48 |
| 14 *n* | Feed *n* print lines | 39 |
| 15 *n* | Feed *n* dot rows | 39 |
| 16 *n* | Add *n* extra dot rows | 40 |
| 17 | Print | 40 |
| 18 | Cancel print data in page mode | 90 |
| 19 | Perform full knife cut (or code 1B 69) | 34 |
| 1A | Perform partial knife cut (or code 1B 6D) | 34 |
| 1B (+*.BMP) | Download BMP logo (where +*.BMP is the data from the file, not the filename.) | 59 |
| 1B 07 | Generate tone | 35 |
| 1B 0C | Print data in page mode | 90 |
| 1B 12 | Select 90 degree counter-clockwise rotated print | 48 |
| 1B 14 *n* | Set column | 42 |
| 1B 16 *n* | Select pitch (column width) | 49 |
| 1B 20 n | Set right-side character spacing | 49 |
| 1B 21 *n* | Select print mode | 50 |
| 1B 24 *n*L *n*H | Set absolute starting position | 43 |
| 1B 25 *n* | Select or cancel user-defined character set | 51 |
| 1B 26 *s c1 c2* | Define user-defined character set | 51 |
| 1B 27 *m a0 a1 a2 d1 … dm* | Write to user data storage | 96 |
| 1B 2A *m n1 n2 d1...dn* | Select bit image mode | 60 |
| 1B 2D *n* | Select or cancel underline mode | 52 |
| 1B 2E *m n rL rH d1 … dn* | Print advanced raster graphics | 61 |
| 1B 32 | Set vertical line spacing to 1/6 inch | 43 |

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 1B 33 *n* | Set vertical line spacing | 44 |
| 1B 34 *m a0 a1 a2* | Read from user data storage | 96 |
| 1B 3A 30 30 30 | Copy character set from ROM to RAM | 53 |
| 1B 3D *n* | Select peripheral device (for multi-drop) | 35 |
| 1B 3F *n* | Cancel user-defined character | 53 |
| 1B 40 | Initialize printer | 35 |
| 1B 44 [*n*] *k* 00 | Set horizontal tab positions | 44 |
| 1B 45 *n* | Select or cancel emphasized mode | 53 |
| 1B 47 *n* | Select or cancel double-strike | 54 |
| 1B 49 *n* | Select or cancel italic print | 54 |
| 1B 4A *n* | Print and feed paper | 41 |
| 1B 4B *n1 n2 d1...dn* | Select single-density graphics | 61 |
| 1B 4C | Select page mode | 91 |
| 1B 52 *n* | Select international character code | 55 |
| 1B 53 | Select standard mode | 92 |
| 1B 54 n | Select print direction in page mode | 92 |
| 1B 56 *n* | Select or cancel 90 degree clockwise rotated print | 55 |
| 1B 57 *n1, n2...n8* | Set print area in page mode | 93 |
| 1B 59 *n1 n2 d1...dn* | Select double-density graphics | 61 |
| 1B 5B 7D | Switch to flash download mode | 100 |
| 1B 5C *n1 n2* | Set relative print position | 45 |
| 1B 61 *n* | Select justification | 46 |
| 1B 63 33 *n* | Select paper sensors to output paper end signals (parallel only) | 36 |
| 1B 63 34 *n* | Select sensors to stop printing | 36 |
| 1B 63 35 *n* | Enable or disable panel button | 37 |
| 1B 64 *n* | Print and feed *n* lines | 41 |
| 1B 69 | Perform full knife cut (or code 19) | 34 |
| 1B 6A *k* | Read from non-volatile memory (NVRAM) | 96 |
| 1B 6D | Perform partial knife cut (or code 1A) | 34 |
| 1B 70 *n p1 p2* | Generate pulse to open cash drawer | 37 |
| 1B 73 *n1 n2 k* | Write to non-volatile memory (NVRAM) | 96 |
| 1B 74 *n* | Select international character set | 56 |
| 1B 75 0 | Transmit peripheral device status (RS-232C printers only) | 66 |
| 1B 75 *n* | Request alternate status (A793 emulation only) | 66 |
| 1B 76 | Transmit paper sensor status | 67 |
| 1B 7B *n* | Select or cancel upside-down print mode | 56 |
| 1C 70 *m n* | Print Flash Logo | 62 |
| 1C 71 *n* . . . | Define Flash Logos | 62 |

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 1D 00 | Return boot sector firmware part number | 100 |
| 1D 01 | Return segment number status of flash memory | 101 |
| 1D 02 *nn* | Select flash memory sector to download | 101 |
| 1D 03 n | Real time request to printer (GS sequence) | 77 |
| 1D 04 *n* | Real time status transmission (GS sequence) | 74 |
| 1D 05 | Real time printer status transmission | 78 |
| 1D 06 | Get firmware CRC | 101 |
| 1D 07 | Return microprocessor CRC | 101 |
| 1D 0E | Erase all flash contents except boot sector | 101 |
| 1D 0F | Return main program flash CRC | 102 |
| 1D 10 *n* | Erase selected flash sector | 102 |
| 1D 11 *aL aH cL cH d1...dn* | Download to active flash sector | 102 |
| 1D 21 *n* | Select character size | 57 |
| 1D 22 *n* | Select memory type (SRAM/Flash) where to save logos or user-defined fonts | 97 |
| 1D 22 55 *n1 n2* | Flash memory user sectors allocation | 97 |
| 1D 22 80 | Expanded flash memory allocation | 98 |
| 1D 22 81 *n* | Select flash area for storing logos and fonts | 98 |
| 1D 23 *n* | Select the current logo (downloaded bit image) | 62 |
| 1D 24 *nL nH* | Set absolute vertical print position in page mode | 94 |
| 1D 2A *n1 n2 d1...dn* | Define downloaded bit image | 63 |
| 1D 2F *m* | Print downloaded bit image | 64 |
| 1D 3A | Select or cancel macro definition | 95 |
| 1D 40 *n* | Erase user flash sector | 99 |
| 1D 42 *n* | Select or cancel white/black reverse print mode | 58 |
| 1D 48 *n* | Select printing position of HRI characters | 83 |
| 1D 49 *n* | Transmit printer ID | 68 |
| 1D 49 40 *n* | Transmit printer ID, remote diagnostics extension | 69 |
| 1D 4C *nL nH* | Set left margin | 46 |
| 1D 50 *x y* | Set horizontal and vertical minimum motion units | 42 |
| 1D 56 *m* | Select cut mode and cut paper (or code 1D 56 *m n*) | 38 |
| 1D 56 m n | Select cut mode and cut paper (or code 1D 56 m) | 38 |
| 1D 57 *nL nH* | Set printing area width | 47 |
| 1D 5C *nL nH* | Set relative vertical print position in page mode | 94 |
| 1D 5E *r t m* | Execute macro | 95 |
| 1D 61 *n* | Select or cancel unsolicited status mode | 79 |
| 1D 66 *n* | Select pitch of HRI characters | 83 |
| 1D 68 *n* | Select bar code height | 83 |

| Code (hexadecimal) | Command | Page |
|---|---|---|
| 1D 6B *m d1...dk* 00<br>or<br>1D 6B *m n d1...dn* | Print bar code<br><br>Print bar code | 84<br><br>84 |
| 1D 6B FF *n* | Print Multiple Barcodes | 85 |
| 1D 6B *n* d1... 00 | Print GS1 Databar (formerly RSS), null terminated | 87 |
| 1D 6B *m n* L *n* H d1... dn | Print GS1 Databar (formerly RSS), data length specified | 87 |
| 1D 70 a b c d e f | Select PDF 417 parameters | 88 |
| 1D 71 *a b c d e f* L *f* H | Set GSI Databar (formerly RSS) parameters | 86 |
| 1D 72 n | Transmit status | 71 |
| 1D 77 n | Select bar code width | 89 |
| 1D FF | Reset Firmware | 102 |
| 1F 04 n | Convert 6-dots/mm bitmap to 8-dots/mm bitmap | 64 |
| 1F 05 n | Select superscript or subscript modes | 59 |
| 1F 26 *s c1 c2* | Define extended user-defined character set | 52 |
| 1F 56 | Send printer software version | 72 |
| 1F 69 n | Select active user-defined character set | 59 |
| 1F 74 | Print test form | 38 |
| 1F 7A | Real time commands disable | 78 |

# Appendix B:
# Resident Character Sets

## Character sets

### Code page 437 (US)

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00 0 | 10 16 | 20 SP 32 | 30 0 48 | 40 @ 64 | 50 P 80 | 60 ` 96 | 70 p 112 | 80 Ç 128 | 90 É 144 | A0 á 160 | B0 ⁝ 176 | C0 └ 192 | D0 ╨ 208 | E0 ∝ 224 | F0 ≡ 240 |
| 01 1 | 11 17 | 21 ! 33 | 31 1 49 | 41 A 65 | 51 Q 81 | 61 a 97 | 71 q 113 | 81 ü 129 | 91 æ 145 | A1 í 161 | B1 ▒ 177 | C1 ┴ 193 | D1 ╤ 209 | E1 β 225 | F1 ± 241 |
| 02 2 | 12 18 | 22 " 34 | 32 2 50 | 42 B 66 | 52 R 82 | 62 b 98 | 72 r 114 | 82 é 130 | 92 Æ 146 | A2 ó 162 | B2 ▓ 178 | C2 ┬ 194 | D2 ╥ 210 | E2 Γ 226 | F2 ≥ 242 |
| 03 3 | 13 19 | 23 # 35 | 33 3 51 | 43 C 67 | 53 S 83 | 63 c 99 | 73 s 115 | 83 â 131 | 93 ô 147 | A3 ú 163 | B3 │ 179 | C3 ├ 195 | D3 ╙ 211 | E3 π 227 | F3 ≤ 243 |
| 04 4 | 14 20 | 24 $ 36 | 34 4 52 | 44 D 68 | 54 T 84 | 64 d 100 | 74 t 116 | 84 ä 132 | 94 ö 148 | A4 ñ 164 | B4 ┤ 180 | C4 ─ 196 | D4 ╘ 212 | E4 Σ 228 | F4 ⌠ 244 |
| 05 5 | 15 21 | 25 % 37 | 35 5 53 | 45 E 69 | 55 U 85 | 65 e 101 | 75 u 117 | 85 à 133 | 95 ò 149 | A5 Ñ 165 | B5 ╡ 181 | C5 ┼ 197 | D5 ╒ 213 | E5 σ 229 | F5 ⌡ 245 |
| 06 6 | 16 22 | 26 & 38 | 36 6 54 | 46 F 70 | 56 V 86 | 66 f 103 | 76 v 118 | 86 å 134 | 96 û 150 | A6 ª 166 | B6 ╢ 182 | C6 ╞ 198 | D6 ╓ 214 | E6 µ 230 | F6 ÷ 246 |
| 07 7 | 17 23 | 27 ' 39 | 37 7 55 | 47 G 71 | 57 W 87 | 67 g 103 | 77 w 119 | 87 ç 135 | 97 ù 151 | A7 º 167 | B7 ╖ 183 | C7 ╟ 199 | D7 ╫ 215 | E7 τ 231 | F7 ≈ 247 |
| 08 8 | 18 24 | 28 ( 40 | 38 8 56 | 48 H 72 | 58 X 88 | 68 h 104 | 78 x 120 | 88 ê 136 | 98 ÿ 152 | A8 ¿ 168 | B8 ╕ 184 | C8 ╚ 200 | D8 ╪ 216 | E8 ϕ 232 | F8 ° 248 |
| 09 9 | 19 25 | 29 ) 41 | 39 9 57 | 49 I 73 | 59 Y 89 | 69 i 105 | 79 y 121 | 89 ë 137 | 99 Ö 153 | A9 ⌐ 169 | B9 ╣ 185 | C9 ╔ 201 | D9 ┘ 217 | E9 Θ 233 | F9 • 249 |
| 0A 10 | 1A 26 | 2A * 42 | 3A : 58 | 4A J 74 | 5A Z 90 | 6A j 106 | 7A z 122 | 8A è 138 | 9A Ü 154 | AA ¬ 170 | BA ║ 186 | CA ╩ 202 | DA ┌ 218 | EA Ω 234 | FA · 250 |
| 0B 11 | 1B 27 | 2B + 43 | 3B ; 59 | 4B K 75 | 5B [ 91 | 6B k 107 | 7B { 123 | 8B ï 139 | 9B ¢ 155 | AB ½ 171 | BB ╗ 187 | CB ╦ 203 | DB ▉ 219 | EB δ 235 | FB √ 251 |
| 0C 12 | 1C 28 | 2C , 44 | 3C < 60 | 4C L 76 | 5C \ 92 | 6C l 108 | 7C \| 124 | 8C î 140 | 9C £ 156 | AC ¼ 172 | BC ╝ 188 | CC ╠ 204 | DC ▄ 220 | EC ∞ 236 | FC n 252 |
| 0D 13 | 1D 29 | 2D - 45 | 3D = 61 | 4D M 77 | 5D ] 93 | 6D m 109 | 7D } 125 | 8D ì 141 | 9D ¥ 157 | AD ¡ 173 | BD ╜ 189 | CD ═ 205 | DD ▌ 221 | ED ∅ 237 | FD ² 253 |
| 0E 14 | 1E 30 | 2E . 46 | 3E > 62 | 4E N 78 | 5E ^ 94 | 6E n 110 | 7E ~ 126 | 8E Ä 142 | 9E Pt 158 | AE « 174 | BE ╛ 190 | CE ╬ 206 | DE ▐ 222 | EE ε 238 | FE ■ 254 |
| 0F 15 | 1F 31 | 2F / 47 | 3F ? 63 | 4F O 79 | 5F _ 95 | 6F o 111 | 7F DEL △ 127 | 8F Å 143 | 9F ƒ 159 | AF » 175 | BF ┐ 191 | CF ╧ 207 | DF ▀ 223 | EF ∩ 239 | FF BLANK 255 |

## Code page 737 (Greek)

| 00 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | A0 | B0 | C0 | D0 | E0 | F0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 16 | SP 32 | 0 48 | @ 64 | P 80 | ` 96 | p 112 | A 128 | P 144 | ι 160 | ⁝ 176 | └ 192 | ╨ 208 | ω 224 | Ώ 240 |
| 01 | 11 | 21 | 31 | 41 | 51 | 61 | 71 | 81 | 91 | A1 | B1 | C1 | D1 | E1 | F1 |
| 1 | 17 | ! 33 | 1 49 | A 65 | Q 81 | a 97 | q 113 | B 129 | Σ 145 | κ 161 | ⁞ 177 | ┴ 193 | ╤ 209 | ά 225 | ± 241 |
| 02 | 12 | 22 | 32 | 42 | 52 | 62 | 72 | 82 | 92 | A2 | B2 | C2 | D2 | E2 | F2 |
| 2 | 18 | " 34 | 2 50 | B 66 | R 82 | b 98 | r 114 | Γ 130 | T 146 | λ 162 |   178 | ┬ 194 | ╥ 210 | έ 226 | ≥ 242 |
| 03 | 13 | 23 | 33 | 43 | 53 | 63 | 73 | 83 | 93 | A3 | B3 | C3 | D3 | E3 | F3 |
| 3 | 19 | # 35 | 3 51 | C 67 | S 83 | c 99 | s 115 | Δ 131 | Y 147 | μ 163 |  179 | ├ 195 | ╙ 211 | ή 227 | ≤ 243 |
| 04 | 14 | 24 | 34 | 44 | 54 | 64 | 74 | 84 | 94 | A4 | B4 | C4 | D4 | E4 | F4 |
| 4 | 20 | $ 36 | 4 52 | D 68 | T 84 | d 100 | t 116 | E 132 | ϕ 148 | ν 164 | ⁡ 180 | ─ 196 | ╘ 212 | ϊ 228 | ⌠ 244 |
| 05 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 95 | A5 | B5 | C5 | D5 | E5 | F5 |
| 5 | 21 | % 37 | 5 53 | E 69 | U 85 | e 101 | u 117 | Z 133 | X 149 | ξ 165 | ⁢ 181 | ┼ 197 | ╒ 213 | ί 229 | ⌡ 245 |
| 06 | 16 | 26 | 36 | 46 | 56 | 66 | 76 | 86 | 96 | A6 | B6 | C6 | D6 | E6 | F6 |
| 6 | 22 | & 38 | 6 54 | F 70 | V 86 | f 103 | v 118 | H 134 | Ψ 150 | ο 166 | ⁣ 182 | ╞ 198 | ╓ 214 | ό 230 | ÷ 246 |
| 07 | 17 | 27 | 37 | 47 | 57 | 67 | 77 | 87 | 97 | A7 | B7 | C7 | D7 | E7 | F7 |
| 7 | 23 | ' 39 | 7 55 | G 71 | W 87 | g 103 | w 119 | Θ 135 | Ω 151 | π 167 | ⁤ 183 | ╟ 199 | ╫ 215 | ύ 231 | ≈ 247 |
| 08 | 18 | 28 | 38 | 48 | 58 | 68 | 78 | 88 | 98 | A8 | B8 | C8 | D8 | E8 | F8 |
| 8 | 24 | ( 40 | 8 56 | H 72 | X 88 | h 104 | x 120 | I 136 | ∝ 152 | ρ 168 | ⁥ 184 | ╚ 200 | ╪ 216 | ϋ 232 | ° 248 |
| 09 | 19 | 29 | 39 | 49 | 59 | 69 | 79 | 89 | 99 | A9 | B9 | C9 | D9 | E9 | F9 |
| 9 | 25 | ) 41 | 9 57 | I 73 | Y 89 | i 105 | y 121 | K 137 | β 153 | σ 169 | ⁦ 185 | ╔ 201 | ┘ 217 | ώ 233 | ∙ 249 |
| 0A | 1A | 2A | 3A | 4A | 5A | 6A | 7A | 8A | 9A | AA | BA | CA | DA | EA | FA |
| 10 | 26 | * 42 | : 58 | J 74 | Z 90 | j 106 | z 122 | Λ 138 | γ 154 | ς 170 | ⁧ 186 | ╩ 202 | ┌ 218 | Ά 234 | · 250 |
| 0B | 1B | 2B | 3B | 4B | 5B | 6B | 7B | 8B | 9B | AB | BB | CB | DB | EB | FB |
| 11 | 27 | + 43 | ; 59 | K 75 | [ 91 | k 107 | { 123 | M 139 | δ 155 | τ 171 | ⁨ 187 | ╦ 203 | ▉ 219 | Έ 235 | √ 251 |
| 0C | 1C | 2C | 3C | 4C | 5C | 6C | 7C | 8C | 9C | AC | BC | CC | DC | EC | FC |
| 12 | 28 | , 44 | < 60 | L 76 | \ 92 | l 108 | \| 124 | N 140 | ε 156 | υ 172 | ⁩ 188 | ╠ 204 | ▬ 220 | Ή 236 | n 252 |
| 0D | 1D | 2D | 3D | 4D | 5D | 6D | 7D | 8D | 9D | AD | BD | CD | DD | ED | FD |
| 13 | 29 | - 45 | = 61 | M 77 | ] 93 | m 109 | } 125 | Ξ 141 | ζ 157 | φ 173 | ⁪ 189 | ═ 205 | ▌ 221 | Ί 237 | ² 253 |
| 0E | 1E | 2E | 3E | 4E | 5E | 6E | 7E | 8E | 9E | AE | BE | CE | DE | EE | FE |
| 14 | 30 | . 46 | > 62 | N 78 | ^ 94 | n 110 | ~ 126 | O 142 | η 158 | χ 174 | ⁫ 190 | ╬ 206 | ▐ 222 | Ό 238 | ■ 254 |
| 0F | 1F | 2F | 3F | 4F | 5F | 6F | 7F DEL | 8F | 9F | AF | BF | CF | DF | EF | FF |
| 15 | 31 | / 47 | ? 63 | O 79 | _ 95 | o 111 | △ 127 | Π 143 | θ 159 | ψ 175 | ⁬ 191 | ╧ 207 | ▄ 223 | Ύ 239 | BLANK 255 |

## Code page 850 (Multilingual)

| 00 0 | 10 16 | 20 32 | 30 0 48 | 40 @ 64 | 50 P 80 | 60 ` 96 | 70 p 112 | 80 Ç 128 | 90 É 144 | A0 á 160 | B0 ⁝ 176 | C0 └ 192 | D0 ð 208 | E0 Ó 224 | F0 – 240 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 1 | 11 17 | 21 ! 33 | 31 1 49 | 41 A 65 | 51 Q 81 | 61 a 97 | 71 q 113 | 81 ü 129 | 91 æ 145 | A1 í 161 | B1 ▒ 177 | C1 ┴ 193 | D1 Đ 209 | E1 ß 225 | F1 ± 241 |
| 02 2 | 12 18 | 22 " 34 | 32 2 50 | 42 B 66 | 52 R 82 | 62 b 98 | 72 r 114 | 82 é 130 | 92 Æ 146 | A2 ó 162 | B2 ▓ 178 | C2 ┬ 194 | D2 Ê 210 | E2 Ô 226 | F2 ‗ 242 |
| 03 3 | 13 19 | 23 # 35 | 33 3 51 | 43 C 67 | 53 S 83 | 63 c 99 | 73 s 115 | 83 â 131 | 93 ô 147 | A3 ú 163 | B3 │ 179 | C3 ├ 195 | D3 Ë 211 | E3 Ò 227 | F3 ¾ 243 |
| 04 4 | 14 20 | 24 $ 36 | 34 4 52 | 44 D 68 | 54 T 84 | 64 d 100 | 74 t 116 | 84 ä 132 | 94 ö 148 | A4 ñ 164 | B4 ┤ 180 | C4 ─ 196 | D4 È 212 | E4 õ 228 | F4 ¶ 244 |
| 05 5 | 15 21 | 25 % 37 | 35 5 53 | 45 E 69 | 55 U 85 | 65 e 101 | 75 u 117 | 85 à 133 | 95 ò 149 | A5 Ñ 165 | B5 Á 181 | C5 ┼ 197 | D5 ı 213 | E5 Õ 229 | F5 § 245 |
| 06 6 | 16 22 | 26 & 38 | 36 6 54 | 46 F 70 | 56 V 86 | 66 f 103 | 76 v 118 | 86 å 134 | 96 û 150 | A6 ª 166 | B6 Â 182 | C6 ã 198 | D6 Í 214 | E6 µ 230 | F6 ÷ 246 |
| 07 7 | 17 23 | 27 ' 39 | 37 7 55 | 47 G 71 | 57 W 87 | 67 g 103 | 77 w 119 | 87 ç 135 | 97 ù 151 | A7 º 167 | B7 À 183 | C7 Ã 199 | D7 Î 215 | E7 þ 231 | F7 ¸ 247 |
| 08 8 | 18 24 | 28 ( 40 | 38 8 56 | 48 H 72 | 58 X 88 | 68 h 104 | 78 x 120 | 88 ê 136 | 98 ÿ 152 | A8 ¿ 168 | B8 © 184 | C8 ╚ 200 | D8 Ï 216 | E8 Þ 232 | F8 º 248 |
| 09 9 | 19 25 | 29 ) 41 | 39 9 57 | 49 I 73 | 59 Y 89 | 69 i 105 | 79 y 121 | 89 ë 137 | 99 Ö 153 | A9 ® 169 | B9 ╣ 185 | C9 ╔ 201 | D9 ┘ 217 | E9 Ú 233 | F9 ¨ 249 |
| 0A 10 | 1A 26 | 2A * 42 | 3A : 58 | 4A J 74 | 5A Z 90 | 6A j 106 | 7A z 122 | 8A è 138 | 9A Ü 154 | AA ¬ 170 | BA ║ 186 | CA ╩ 202 | DA ┌ 218 | EA Û 234 | FA · 250 |
| 0B 11 | 1B 27 | 2B + 43 | 3B ; 59 | 4B K 75 | 5B [ 91 | 6B k 107 | 7B { 123 | 8B ï 139 | 9B ø 155 | AB ½ 171 | BB ╗ 187 | CB ╦ 203 | DB ▉ 219 | EB Ù 235 | FB ¹ 251 |
| 0C 12 | 1C 28 | 2C , 44 | 3C < 60 | 4C L 76 | 5C \ 92 | 6C l 108 | 7C \| 124 | 8C î 140 | 9C £ 156 | AC ¼ 172 | BC ╝ 188 | CC ╠ 204 | DC ▄ 220 | EC ý 236 | FC ³ 252 |
| 0D 13 | 1D 29 | 2D - 45 | 3D = 61 | 4D M 77 | 5D ] 93 | 6D m 109 | 7D } 125 | 8D ì 141 | 9D Ø 157 | AD ¡ 173 | BD ¢ 189 | CD ═ 205 | DD ¦ 221 | ED Ý 237 | FD ² 253 |
| 0E 14 | 1E 30 | 2E . 46 | 3E > 62 | 4E N 78 | 5E ^ 94 | 6E n 110 | 7E ~ 126 | 8E Ä 142 | 9E × 158 | AE « 174 | BE ¥ 190 | CE ╬ 206 | DE Ì 222 | EE ‗ 238 | FE ■ 254 |
| 0F 15 | 1F 31 | 2F / 47 | 3F ? 63 | 4F O 79 | 5F _ 95 | 6F o 111 | 7F △ 127 | 8F Å 143 | 9F ƒ 159 | AF » 175 | BF ┐ 191 | CF ¤ 207 | DF ▀ 223 | EF ´ 239 | FF 255 |

## Code page 852 (Slavic)

| 00 0 | 10 16 | 20 32 | 30 0 48 | 40 @ 64 | 50 P 80 | 60 ` 96 | 70 p 112 | 80 Ç 128 | 90 É 144 | A0 á 160 | B0 ⣿ 176 | C0 └ 192 | D0 đ 208 | E0 Ó 224 | F0 – 240 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 1 | 11 17 | 21 ! 33 | 31 1 49 | 41 A 65 | 51 Q 81 | 61 a 97 | 71 q 113 | 81 ü 129 | 91 Ĺ 145 | A1 í 161 | B1 ⣿ 177 | C1 ┴ 193 | D1 Đ 209 | E1 ß 225 | F1 ´´ 241 |
| 02 2 | 12 18 | 22 " 34 | 32 2 50 | 42 B 66 | 52 R 82 | 62 b 98 | 72 r 114 | 82 é 130 | 92 Í 146 | A2 ó 162 | B2 ⣿ 178 | C2 ┬ 194 | D2 Ď 210 | E2 Ô 226 | F2 ˛ 242 |
| 03 3 | 13 19 | 23 # 35 | 33 3 51 | 43 C 67 | 53 S 83 | 63 c 99 | 73 s 115 | 83 â 131 | 93 ô 147 | A3 ú 163 | B3 ⣿ 179 | C3 ├ 195 | D3 Ë 211 | E3 Ń 227 | F3 ˇ 243 |
| 04 4 | 14 20 | 24 $ 36 | 34 4 52 | 44 D 68 | 54 T 84 | 64 d 100 | 74 t 116 | 84 ä 132 | 94 ö 148 | A4 Ą 164 | B4 ⣿ 180 | C4 ─ 196 | D4 ď 212 | E4 ń 228 | F4 ˆ 244 |
| 05 5 | 15 21 | 25 % 37 | 35 5 53 | 45 E 69 | 55 U 85 | 65 e 101 | 75 u 117 | 85 ů 133 | 95 Ľ 149 | A5 ą 165 | B5 Á 181 | C5 ┼ 197 | D5 Ň 213 | E5 ň 229 | F5 § 245 |
| 06 6 | 16 22 | 26 & 38 | 36 6 54 | 46 F 70 | 56 V 86 | 66 f 103 | 76 v 118 | 86 ć 134 | 96 ľ 150 | A6 Ž 166 | B6 Â 182 | C6 Ă 198 | D6 Í 214 | E6 Š 230 | F6 ÷ 246 |
| 07 7 | 17 23 | 27 ' 39 | 37 7 55 | 47 G 71 | 57 W 87 | 67 g 103 | 77 w 119 | 87 ç 135 | 97 Ś 151 | A7 ž 167 | B7 Ě 183 | C7 ă 199 | D7 Î 215 | E7 š 231 | F7 ¸ 247 |
| 08 8 | 18 24 | 28 ( 40 | 38 8 56 | 48 H 72 | 58 X 88 | 68 h 104 | 78 x 120 | 88 ł 136 | 98 ś 152 | A8 Ę 168 | B8 Ş 184 | C8 ╚ 200 | D8 ě 216 | E8 Ŕ 232 | F8 º 248 |
| 09 9 | 19 25 | 29 ) 41 | 39 9 57 | 49 I 73 | 59 Y 89 | 69 i 105 | 79 y 121 | 89 ë 137 | 99 Ö 153 | A9 ę 169 | B9 ╣ 185 | C9 ╔ 201 | D9 ┘ 217 | E9 Ú 233 | F9 ¨ 249 |
| 0A 10 | 1A 26 | 2A * 42 | 3A : 58 | 4A J 74 | 5A Z 90 | 6A j 106 | 7A z 122 | 8A Ő 138 | 9A Ü 154 | AA 170 | BA ⣿ 186 | CA ╩ 202 | DA ┌ 218 | EA ŕ 234 | FA · 250 |
| 0B 11 | 1B 27 | 2B + 43 | 3B ; 59 | 4B K 75 | 5B [ 91 | 6B k 107 | 7B { 123 | 8B ő 139 | 9B Ť 155 | AB ź 171 | BB ⣿ 187 | CB ╦ 203 | DB ⣿ 219 | EB Ú 235 | FB ű 251 |
| 0C 12 | 1C 28 | 2C , 44 | 3C < 60 | 4C L 76 | 5C \ 92 | 6C l 108 | 7C \| 124 | 8C î 140 | 9C ť 156 | AC Č 172 | BC ⣿ 188 | CC ╠ 204 | DC ▄ 220 | EC ý 236 | FC Ř 252 |
| 0D 13 | 1D 29 | 2D - 45 | 3D = 61 | 4D M 77 | 5D ] 93 | 6D m 109 | 7D } 125 | 8D Ź 141 | 9D Ł 157 | AD ş 173 | BD Ż 189 | CD ═ 205 | DD Ţ 221 | ED Ý 237 | FD ř 253 |
| 0E 14 | 1E 30 | 2E . 46 | 3E > 62 | 4E N 78 | 5E ^ 94 | 6E n 110 | 7E ~ 126 | 8E Ä 142 | 9E × 158 | AE « 174 | BE Ż 190 | CE ╬ 206 | DE Ů 222 | EE ţ 238 | FE ■ 254 |
| 0F 15 | 1F 31 | 2F / 47 | 3F ? 63 | 4F O 79 | 5F _ 95 | 6F o 111 | 7F △ 127 | 8F Ć 143 | 9F č 159 | AF » 175 | BF ⣿ 191 | CF ¤ 207 | DF ▀ 223 | EF ´ 239 | FF 255 |

## Code page 857 (Turkish)

| 00 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | A0 | B0 | C0 | D0 | E0 | F0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 16 | SP 32 | 0 48 | @ 64 | P 80 | ` 96 | p 112 | Ç 128 | É 144 | á 160 | ▒ 176 | └ 192 | º 208 | Ó 224 | 240 |
| 01 | 11 | 21 | 31 | 41 | 51 | 61 | 71 | 81 | 91 | A1 | B1 | C1 | D1 | E1 | F1 |
| 1 | 17 | ! 33 | 1 49 | A 65 | Q 81 | a 97 | q 113 | ü 129 | æ 145 | í 161 | ▓ 177 | ┴ 193 | a 209 | β 225 | ± 241 |
| 02 | 12 | 22 | 32 | 42 | 52 | 62 | 72 | 82 | 92 | A2 | B2 | C2 | D2 | E2 | F2 |
| 2 | 18 | " 34 | 2 50 | B 66 | R 82 | b 98 | r 114 | é 130 | Æ 146 | ó 162 | ▓ 178 | ┬ 194 | Ê 210 | Ô 226 | ¾ 242 |
| 03 | 13 | 23 | 33 | 43 | 53 | 63 | 73 | 83 | 93 | A3 | B3 | C3 | D3 | E3 | F3 |
| 3 | 19 | # 35 | 3 51 | C 67 | S 83 | c 99 | s 115 | â 131 | ô 147 | ú 163 | │ 179 | ├ 195 | Ë 211 | Ò 227 | ¶ 243 |
| 04 | 14 | 24 | 34 | 44 | 54 | 64 | 74 | 84 | 94 | A4 | B4 | C4 | D4 | E4 | F4 |
| 4 | 20 | $ 36 | 4 52 | D 68 | T 84 | d 100 | t 116 | ä 132 | ö 148 | ñ 164 | ┤ 180 | ─ 196 | È 212 | õ 228 | § 244 |
| 05 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 95 | A5 | B5 | C5 | D5 | E5 | F5 |
| 5 | 21 | % 37 | 5 53 | E 69 | U 85 | e 101 | u 117 | à 133 | ò 149 | Ñ 165 | Á 181 | ┼ 197 | 213 | Õ 229 | ÷ 245 |
| 06 | 16 | 26 | 36 | 46 | 56 | 66 | 76 | 86 | 96 | A6 | B6 | C6 | D6 | E6 | F6 |
| 6 | 22 | & 38 | 6 54 | F 70 | V 86 | f 103 | v 118 | å 134 | û 150 | Ğ 166 | Â 182 | ã 198 | Í 214 | µ 230 | ´ 246 |
| 07 | 17 | 27 | 37 | 47 | 57 | 67 | 77 | 87 | 97 | A7 | B7 | C7 | D7 | E7 | F7 |
| 7 | 23 | ' 39 | 7 55 | G 71 | W 87 | g 103 | w 119 | ç 135 | ù 151 | ğ 167 | À 183 | Ã 199 | Î 215 | 231 | ° 247 |
| 08 | 18 | 28 | 38 | 48 | 58 | 68 | 78 | 88 | 98 | A8 | B8 | C8 | D8 | E8 | F8 |
| 8 | 24 | ( 40 | 8 56 | H 72 | X 88 | h 104 | x 120 | ê 136 | İ 152 | ¿ 168 | © 184 | ╚ 200 | Ï 216 | × 232 | ° 248 |
| 09 | 19 | 29 | 39 | 49 | 59 | 69 | 79 | 89 | 99 | A9 | B9 | C9 | D9 | E9 | F9 |
| 9 | 25 | ) 41 | 9 57 | I 73 | Y 89 | i 105 | y 121 | ë 137 | Ö 153 | ® 169 | ╣ 185 | ╔ 201 | ┘ 217 | Ú 233 | ¨ 249 |
| 0A | 1A | 2A | 3A | 4A | 5A | 6A | 7A | 8A | 9A | AA | BA | CA | DA | EA | FA |
| 10 | 26 | * 42 | : 58 | J 74 | Z 90 | j 106 | z 122 | è 138 | Ü 154 | ¬ 170 | ║ 186 | ╩ 202 | ┌ 218 | Û 234 | · 250 |
| 0B | 1B | 2B | 3B | 4B | 5B | 6B | 7B | 8B | 9B | AB | BB | CB | DB | EB | FB |
| 11 | 27 | + 43 | ; 59 | K 75 | [ 91 | k 107 | { 123 | ï 139 | ø 155 | ½ 171 | ╗ 187 | ╦ 203 | 219 | Ù 235 | ¹ 251 |
| 0C | 1C | 2C | 3C | 4C | 5C | 6C | 7C | 8C | 9C | AC | BC | CC | DC | EC | FC |
| 12 | 28 | , 44 | < 60 | L 76 | \ 92 | l 108 | \| 124 | î 140 | £ 156 | ¼ 172 | ╝ 188 | ╠ 204 | ▄ 220 | ì 236 | ³ 252 |
| 0D | 1D | 2D | 3D | 4D | 5D | 6D | 7D | 8D | 9D | AD | BD | CD | DD | ED | FD |
| 13 | 29 | - 45 | = 61 | M 77 | ] 93 | m 109 | } 125 | ı 141 | Ø 157 | ¡ 173 | ¢ 189 | ═ 205 | ▌ 221 | ÿ 237 | ² 253 |
| 0E | 1E | 2E | 3E | 4E | 5E | 6E | 7E | 8E | 9E | AE | BE | CE | DE | EE | FE |
| 14 | 30 | . 46 | > 62 | N 78 | ^ 94 | n 110 | ~ 126 | Ä 142 | Ş 158 | « 174 | ¥ 190 | ╬ 206 | Ì 222 | ¯ 238 | ■ 254 |
| 0F | 1F | 2F | 3F | 4F | 5F | 6F | 7F DEL | 8F | 9F | AF | BF | CF | DF | EF | FF |
| 15 | 31 | / 47 | ? 63 | O 79 | _ 95 | o 111 | △ 127 | Å 143 | ş 159 | » 175 | ┐ 191 | ¤ 207 | ▀ 223 | ´ 239 | 255 |

## Code page 858 (with Eurosymbol)

| 00 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | A0 | B0 | C0 | D0 | E0 | F0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 16 | 32 | 0 | @ | P | ` | p | Ç | É | á | ⁝ | └ | ð | Ó | – |
| | | | 48 | 64 | 80 | 96 | 112 | 128 | 144 | 160 | 176 | 192 | 208 | 224 | 240 |
| 01 | 11 | 21 | 31 | 41 | 51 | 61 | 71 | 81 | 91 | A1 | B1 | C1 | D1 | E1 | F1 |
| 1 | 17 | ! | 1 | A | Q | a | q | ü | æ | í | ▒ | ┴ | Đ | ß | ± |
| | | 33 | 49 | 65 | 81 | 97 | 113 | 129 | 145 | 161 | 177 | 193 | 209 | 225 | 241 |
| 02 | 12 | 22 | 32 | 42 | 52 | 62 | 72 | 82 | 92 | A2 | B2 | C2 | D2 | E2 | F2 |
| 2 | 18 | " | 2 | B | R | b | r | é | Æ | ó | ▓ | ┬ | Ê | Ô | ‗ |
| | | 34 | 50 | 66 | 82 | 98 | 114 | 130 | 146 | 162 | 178 | 194 | 210 | 226 | 242 |
| 03 | 13 | 23 | 33 | 43 | 53 | 63 | 73 | 83 | 93 | A3 | B3 | C3 | D3 | E3 | F3 |
| 3 | 19 | # | 3 | C | S | c | s | â | ô | ú | │ | ├ | Ë | Ò | ¾ |
| | | 35 | 51 | 67 | 83 | 99 | 115 | 131 | 147 | 163 | 179 | 195 | 211 | 227 | 243 |
| 04 | 14 | 24 | 34 | 44 | 54 | 64 | 74 | 84 | 94 | A4 | B4 | C4 | D4 | E4 | F4 |
| 4 | 20 | $ | 4 | D | T | d | t | ä | ö | ñ | ┤ | ─ | È | õ | ¶ |
| | | 36 | 52 | 68 | 84 | 100 | 116 | 132 | 148 | 164 | 180 | 196 | 212 | 228 | 244 |
| 05 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 95 | A5 | B5 | C5 | D5 | E5 | F5 |
| 5 | 21 | % | 5 | E | U | e | u | à | ò | Ñ | Á | ┼ | € | Õ | § |
| | | 37 | 53 | 69 | 85 | 101 | 117 | 133 | 149 | 165 | 181 | 197 | 213 | 229 | 245 |
| 06 | 16 | 26 | 36 | 46 | 56 | 66 | 76 | 86 | 96 | A6 | B6 | C6 | D6 | E6 | F6 |
| 6 | 22 | & | 6 | F | V | f | v | å | û | ª | Â | ã | Í | µ | ÷ |
| | | 38 | 54 | 70 | 86 | 103 | 118 | 134 | 150 | 166 | 182 | 198 | 214 | 230 | 246 |
| 07 | 17 | 27 | 37 | 47 | 57 | 67 | 77 | 87 | 97 | A7 | B7 | C7 | D7 | E7 | F7 |
| 7 | 23 | ' | 7 | G | W | g | w | ç | ù | º | À | Ã | Î | þ | ¸ |
| | | 39 | 55 | 71 | 87 | 103 | 119 | 135 | 151 | 167 | 183 | 199 | 215 | 231 | 247 |
| 08 | 18 | 28 | 38 | 48 | 58 | 68 | 78 | 88 | 98 | A8 | B8 | C8 | D8 | E8 | F8 |
| 8 | 24 | ( | 8 | H | X | h | x | ê | ÿ | ¿ | © | ╚ | Ï | Þ | º |
| | | 40 | 56 | 72 | 88 | 104 | 120 | 136 | 152 | 168 | 184 | 200 | 216 | 232 | 248 |
| 09 | 19 | 29 | 39 | 49 | 59 | 69 | 79 | 89 | 99 | A9 | B9 | C9 | D9 | E9 | F9 |
| 9 | 25 | ) | 9 | I | Y | i | y | ë | Ö | ® | ╣ | ╔ | ┘ | Ú | ¨ |
| | | 41 | 57 | 73 | 89 | 105 | 121 | 137 | 153 | 169 | 185 | 201 | 217 | 233 | 249 |
| 0A | 1A | 2A | 3A | 4A | 5A | 6A | 7A | 8A | 9A | AA | BA | CA | DA | EA | FA |
| 10 | 26 | * | : | J | Z | j | z | è | Ü | ¬ | ║ | ╩ | ┌ | Û | · |
| | | 42 | 58 | 74 | 90 | 106 | 122 | 138 | 154 | 170 | 186 | 202 | 218 | 234 | 250 |
| 0B | 1B | 2B | 3B | 4B | 5B | 6B | 7B | 8B | 9B | AB | BB | CB | DB | EB | FB |
| 11 | 27 | + | ; | K | [ | k | { | ï | ø | ½ | ╗ | ╦ | ▉ | Ù | ¹ |
| | | 43 | 59 | 75 | 91 | 107 | 123 | 139 | 155 | 171 | 187 | 203 | 219 | 235 | 251 |
| 0C | 1C | 2C | 3C | 4C | 5C | 6C | 7C | 8C | 9C | AC | BC | CC | DC | EC | FC |
| 12 | 28 | , | < | L | \ | l | \| | î | £ | ¼ | ╝ | ╠ | ▄ | ý | ³ |
| | | 44 | 60 | 76 | 92 | 108 | 124 | 140 | 156 | 172 | 188 | 204 | 220 | 236 | 252 |
| 0D | 1D | 2D | 3D | 4D | 5D | 6D | 7D | 8D | 9D | AD | BD | CD | DD | ED | FD |
| 13 | 29 | - | = | M | ] | m | } | ì | Ø | ¡ | ¢ | ═ | ¦ | Ý | ² |
| | | 45 | 61 | 77 | 93 | 109 | 125 | 141 | 157 | 173 | 189 | 205 | 221 | 237 | 253 |
| 0E | 1E | 2E | 3E | 4E | 5E | 6E | 7E | 8E | 9E | AE | BE | CE | DE | EE | FE |
| 14 | 30 | . | > | N | ^ | n | ~ | Ä | × | « | ¥ | ╬ | Ì | ¯ | ■ |
| | | 46 | 62 | 78 | 94 | 110 | 126 | 142 | 158 | 174 | 190 | 206 | 222 | 238 | 254 |
| 0F | 1F | 2F | 3F | 4F | 5F | 6F | 7F | 8F | 9F | AF | BF | CF | DF | EF | FF |
| 15 | 31 | / | ? | O | _ | o | △ | Å | ƒ | » | ┐ | ¤ | ▀ | ´ | |
| | | 47 | 63 | 79 | 95 | 111 | 127 | 143 | 159 | 175 | 191 | 207 | 223 | 239 | 255 |

## Code page 860 (Portuguese)

| 00 NUL 0 | 10 16 | 20 SP 32 | 30 0 48 | 40 @ 64 | 50 P 80 | 60 ` 96 | 70 p 112 | 80 Ç 128 | 90 É 144 | A0 á 160 | B0 ⁞ 176 | C0 └ 192 | D0 ╨ 208 | E0 α 224 | F0 ≡ 240 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 1 | 11 XON 17 | 21 ! 33 | 31 1 49 | 41 A 65 | 51 Q 81 | 61 a 97 | 71 q 113 | 81 ü 129 | 91 À 145 | A1 í 161 | B1 ▒ 177 | C1 ┴ 193 | D1 ╤ 209 | E1 β 225 | F1 ± 241 |
| 02 2 | 12 18 | 22 " 34 | 32 2 50 | 42 B 66 | 52 R 82 | 62 b 98 | 72 r 114 | 82 é 130 | 92 È 146 | A2 ó 162 | B2 ▓ 178 | C2 ┬ 194 | D2 ╥ 210 | E2 Γ 226 | F2 ≥ 242 |
| 03 3 | 13 XOFF 19 | 23 # 35 | 33 3 51 | 43 C 67 | 53 S 83 | 63 c 99 | 73 s 115 | 83 â 131 | 93 ô 147 | A3 ú 163 | B3 │ 179 | C3 ├ 195 | D3 ╙ 211 | E3 π 227 | F3 ≤ 243 |
| 04 4 | 14 20 | 24 $ 36 | 34 4 52 | 44 D 68 | 54 T 84 | 64 d 100 | 74 t 116 | 84 ã 132 | 94 õ 148 | A4 ñ 164 | B4 ┤ 180 | C4 ─ 196 | D4 ╘ 212 | E4 Σ 228 | F4 ⌠ 244 |
| 05 5 | 15 21 | 25 % 37 | 35 5 53 | 45 E 69 | 55 U 85 | 65 e 101 | 75 u 117 | 85 à 133 | 95 ò 149 | A5 Ñ 165 | B5 ╡ 181 | C5 ┼ 197 | D5 ╒ 213 | E5 σ 229 | F5 ⌡ 245 |
| 06 6 | 16 22 | 26 & 38 | 36 6 54 | 46 F 70 | 56 V 86 | 66 f 103 | 76 v 118 | 86 Á 134 | 96 Ú 150 | A6 ª 166 | B6 ╢ 182 | C6 ╞ 198 | D6 ╓ 214 | E6 µ 230 | F6 ÷ 246 |
| 07 7 | 17 23 | 27 ' 39 | 37 7 55 | 47 G 71 | 57 W 87 | 67 g 103 | 77 w 119 | 87 ç 135 | 97 ù 151 | A7 º 167 | B7 ╖ 183 | C7 ╟ 199 | D7 ╫ 215 | E7 τ 231 | F7 ≈ 247 |
| 08 8 | 18 24 | 28 ( 40 | 38 8 56 | 48 H 72 | 58 X 88 | 68 h 104 | 78 x 120 | 88 ê 136 | 98 Ì 152 | A8 ¿ 168 | B8 ╕ 184 | C8 ╚ 200 | D8 ╪ 216 | E8 ϕ 232 | F8 ° 248 |
| 09 9 | 19 25 | 29 ) 41 | 39 9 57 | 49 I 73 | 59 Y 89 | 69 i 105 | 79 y 121 | 89 Ê 137 | 99 Õ 153 | A9 Ò 169 | B9 ╣ 185 | C9 ╔ 201 | D9 ┘ 217 | E9 Θ 233 | F9 ● 249 |
| 0A LF 10 | 1A 26 | 2A * 42 | 3A : 58 | 4A J 74 | 5A Z 90 | 6A j 106 | 7A z 122 | 8A è 138 | 9A Ü 154 | AA ¬ 170 | BA ║ 186 | CA ╩ 202 | DA ┌ 218 | EA Ω 234 | FA • 250 |
| 0B 11 | 1B ESC 27 | 2B + 43 | 3B ; 59 | 4B K 75 | 5B [ 91 | 6B k 107 | 7B { 123 | 8B Í 139 | 9B ¢ 155 | AB ½ 171 | BB ╗ 187 | CB ╦ 203 | DB ▉ 219 | EB δ 235 | FB √ 251 |
| 0C 12 | 1C 28 | 2C , 44 | 3C < 60 | 4C L 76 | 5C \ 92 | 6C l 108 | 7C \| 124 | 8C Ô 140 | 9C £ 156 | AC ¼ 172 | BC ╝ 188 | CC ╠ 204 | DC ▄ 220 | EC ∞ 236 | FC n 252 |
| 0D CR 13 | 1D GS 29 | 2D - 45 | 3D = 61 | 4D M 77 | 5D ] 93 | 6D m 109 | 7D } 125 | 8D ì 141 | 9D Ú 157 | AD ¡ 173 | BD ╜ 189 | CD ═ 205 | DD ▌ 221 | ED ∅ 237 | FD ² 253 |
| 0E 14 | 1E 30 | 2E . 46 | 3E > 62 | 4E N 78 | 5E ^ 94 | 6E n 110 | 7E ~ 126 | 8E Ã 142 | 9E Pt 158 | AE « 174 | BE ╛ 190 | CE ╬ 206 | DE ▐ 222 | EE ε 238 | FE ■ 254 |
| 0F 15 | 1F 31 | 2F / 47 | 3F ? 63 | 4F O 79 | 5F _ 95 | 6F o 111 | 7F SP 127 | 8F Â 143 | 9F Ó 159 | AF » 175 | BF ┐ 191 | CF ╧ 207 | DF ▀ 223 | EF ∩ 239 | FF 255 |

## Code page 862 (Hebrew)

| 00 0 | 10 16 | 20 32 | 30 0 48 | 40 @ 64 | 50 P 80 | 60 ` 96 | 70 p 112 | 80 א 128 | 90 נ 144 | A0 á 160 | B0 ⁝ 176 | C0 └ 192 | D0 ╨ 208 | E0 ∝ 224 | F0 ≡ 240 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 1 | 11 17 | 21 ! 33 | 31 1 49 | 41 A 65 | 51 Q 81 | 61 a 97 | 71 q 113 | 81 ב 129 | 91 ס 145 | A1 í 161 | B1 ⁞ 177 | C1 ┴ 193 | D1 ╤ 209 | E1 β 225 | F1 ± 241 |
| 02 2 | 12 18 | 22 " 34 | 32 2 50 | 42 B 66 | 52 R 82 | 62 b 98 | 72 r 114 | 82 ג 130 | 92 ע 146 | A2 ó 162 | B2   178 | C2 ┬ 194 | D2 ╥ 210 | E2 Γ 226 | F2 ≥ 242 |
| 03 3 | 13 19 | 23 # 35 | 33 3 51 | 43 C 67 | 53 S 83 | 63 c 99 | 73 s 115 | 83 ד 131 | 93 ף 147 | A3 ú 163 | B3  179 | C3 ├ 195 | D3 ╙ 211 | E3 π 227 | F3 ≤ 243 |
| 04 4 | 14 20 | 24 $ 36 | 34 4 52 | 44 D 68 | 54 T 84 | 64 d 100 | 74 t 116 | 84 ה 132 | 94 פ 148 | A4 ñ 164 | B4 ⁡ 180 | C4 ─ 196 | D4 ╘ 212 | E4 Σ 228 | F4 ⌠ 244 |
| 05 5 | 15 21 | 25 % 37 | 35 5 53 | 45 E 69 | 55 U 85 | 65 e 101 | 75 u 117 | 85 ו 133 | 95 ץ 149 | A5 Ñ 165 | B5 ⁢ 181 | C5 ┼ 197 | D5 ╒ 213 | E5 σ 229 | F5 ⌡ 245 |
| 06 6 | 16 22 | 26 & 38 | 36 6 54 | 46 F 70 | 56 V 86 | 66 f 103 | 76 v 118 | 86 ז 134 | 96 צ 150 | A6 ª 166 | B6 ⁣ 182 | C6 ╞ 198 | D6 ╓ 214 | E6 µ 230 | F6 ÷ 246 |
| 07 7 | 17 23 | 27 ' 39 | 37 7 55 | 47 G 71 | 57 W 87 | 67 g 103 | 77 w 119 | 87 ח 135 | 97 ק 151 | A7 º 167 | B7 ⁤ 183 | C7 ╟ 199 | D7 ╫ 215 | E7 τ 231 | F7 ≈ 247 |
| 08 8 | 18 24 | 28 ( 40 | 38 8 56 | 48 H 72 | 58 X 88 | 68 h 104 | 78 x 120 | 88 ט 136 | 98 ר 152 | A8 ¿ 168 | B8 ⁥ 184 | C8 ╚ 200 | D8 ╪ 216 | E8 Φ 232 | F8 ° 248 |
| 09 9 | 19 25 | 29 ) 41 | 39 9 57 | 49 I 73 | 59 Y 89 | 69 i 105 | 79 y 121 | 89 י 137 | 99 ש 153 | A9 ⌐ 169 | B9 ⁦ 185 | C9 ╔ 201 | D9 ┘ 217 | E9 Θ 233 | F9 ∙ 249 |
| 0A 10 | 1A 26 | 2A * 42 | 3A : 58 | 4A J 74 | 5A Z 90 | 6A j 106 | 7A z 122 | 8A ך 138 | 9A ת 154 | AA ¬ 170 | BA ⁧ 186 | CA ╩ 202 | DA ┌ 218 | EA Ω 234 | FA · 250 |
| 0B 11 | 1B 27 | 2B + 43 | 3B ; 59 | 4B K 75 | 5B [ 91 | 6B k 107 | 7B { 123 | 8B כ 139 | 9B ¢ 155 | AB ½ 171 | BB ⁨ 187 | CB ╦ 203 | DB ▉ 219 | EB δ 235 | FB √ 251 |
| 0C 12 | 1C 28 | 2C , 44 | 3C < 60 | 4C L 76 | 5C \ 92 | 6C l 108 | 7C \| 124 | 8C ל 140 | 9C £ 156 | AC ¼ 172 | BC ⁩ 188 | CC ╠ 204 | DC ▄ 220 | EC ∞ 236 | FC n 252 |
| 0D 13 | 1D 29 | 2D - 45 | 3D = 61 | 4D M 77 | 5D ] 93 | 6D m 109 | 7D } 125 | 8D ם 141 | 9D ¥ 157 | AD ¡ 173 | BD ⁪ 189 | CD ═ 205 | DD ▌ 221 | ED ∅ 237 | FD ² 253 |
| 0E 14 | 1E 30 | 2E . 46 | 3E > 62 | 4E N 78 | 5E ^ 94 | 6E n 110 | 7E ~ 126 | 8E מ 142 | 9E Pt 158 | AE « 174 | BE ⁫ 190 | CE ╬ 206 | DE ▐ 222 | EE ε 238 | FE ■ 254 |
| 0F 15 | 1F 31 | 2F / 47 | 3F ? 63 | 4F O 79 | 5F _ 95 | 6F o 111 | 7F △ 127 | 8F ן 143 | 9F ƒ 159 | AF ¤ 175 | BF ⁬ 191 | CF ╧ 207 | DF ▀ 223 | EF ∩ 239 | FF 255 |

## Code page 863 (French Canadian)

| 00 NUL 0 | 10 16 | 20 SP 32 | 30 0 48 | 40 @ 64 | 50 P 80 | 60 ` 96 | 70 p 112 | 80 Ç 128 | 90 É 144 | A0 ¦ 160 | B0 ⁞ 176 | C0 └ 192 | D0 ╨ 208 | E0 α 224 | F0 ≡ 240 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 1 | 11 XON 17 | 21 ! 33 | 31 1 49 | 41 A 65 | 51 Q 81 | 61 a 97 | 71 q 113 | 81 ü 129 | 91 È 145 | A1 ' 161 | B1 ▒ 177 | C1 ┴ 193 | D1 ╤ 209 | E1 β 225 | F1 ± 241 |
| 02 2 | 12 18 | 22 " 34 | 32 2 50 | 42 B 66 | 52 R 82 | 62 b 98 | 72 r 114 | 82 é 130 | 92 Ê 146 | A2 ó 162 | B2 ▓ 178 | C2 ┬ 194 | D2 ╥ 210 | E2 Γ 226 | F2 ≥ 242 |
| 03 3 | 13 XOFF 19 | 23 # 35 | 33 3 51 | 43 C 67 | 53 S 83 | 63 c 99 | 73 s 115 | 83 â 131 | 93 ô 147 | A3 ú 163 | B3 │ 179 | C3 ├ 195 | D3 ╙ 211 | E3 π 227 | F3 ≤ 243 |
| 04 4 | 14 20 | 24 $ 36 | 34 4 52 | 44 D 68 | 54 T 84 | 64 d 100 | 74 t 116 | 84 Â 132 | 94 Ë 148 | A4 ¨ 164 | B4 ┤ 180 | C4 ─ 196 | D4 ╘ 212 | E4 Σ 228 | F4 ⌠ 244 |
| 05 5 | 15 21 | 25 % 37 | 35 5 53 | 45 E 69 | 55 U 85 | 65 e 101 | 75 u 117 | 85 à 133 | 95 Ï 149 | A5 ¸ 165 | B5 ╡ 181 | C5 ┼ 197 | D5 ╒ 213 | E5 σ 229 | F5 ⌡ 245 |
| 06 6 | 16 22 | 26 & 38 | 36 6 54 | 46 F 70 | 56 V 86 | 66 f 103 | 76 v 118 | 86 ¶ 134 | 96 û 150 | A6 ³ 166 | B6 ╢ 182 | C6 ╞ 198 | D6 ╓ 214 | E6 µ 230 | F6 ÷ 246 |
| 07 7 | 17 23 | 27 ' 39 | 37 7 55 | 47 G 71 | 57 W 87 | 67 g 103 | 77 w 119 | 87 ç 135 | 97 ù 151 | A7 _ 167 | B7 ╖ 183 | C7 ╟ 199 | D7 ╫ 215 | E7 τ 231 | F7 ≈ 247 |
| 08 8 | 18 24 | 28 ( 40 | 38 8 56 | 48 H 72 | 58 X 88 | 68 h 104 | 78 x 120 | 88 ê 136 | 98 ¤ 152 | A8 Î 168 | B8 ╕ 184 | C8 ╚ 200 | D8 ╪ 216 | E8 ϕ 232 | F8 ° 248 |
| 09 9 | 19 25 | 29 ) 41 | 39 9 57 | 49 I 73 | 59 Y 89 | 69 i 105 | 79 y 121 | 89 ë 137 | 99 ô 153 | A9 ⌐ 169 | B9 ╣ 185 | C9 ╔ 201 | D9 ┘ 217 | E9 Θ 233 | F9 ● 249 |
| 0A LF 10 | 1A 26 | 2A * 42 | 3A : 58 | 4A J 74 | 5A Z 90 | 6A j 106 | 7A z 122 | 8A è 138 | 9A Ü 154 | AA ¬ 170 | BA ║ 186 | CA ╩ 202 | DA ┌ 218 | EA Ω 234 | FA ∙ 250 |
| 0B 11 | 1B ESC 27 | 2B + 43 | 3B ; 59 | 4B K 75 | 5B [ 91 | 6B k 107 | 7B { 123 | 8B ï 139 | 9B ¢ 155 | AB ½ 171 | BB ╗ 187 | CB ╦ 203 | DB ▉ 219 | EB δ 235 | FB √ 251 |
| 0C 12 | 1C 28 | 2C , 44 | 3C < 60 | 4C L 76 | 5C \ 92 | 6C l 108 | 7C \| 124 | 8C î 140 | 9C £ 156 | AC ¼ 172 | BC ╝ 188 | CC ╠ 204 | DC ▄ 220 | EC ∞ 236 | FC n 252 |
| 0D CR 13 | 1D GS 29 | 2D - 45 | 3D = 61 | 4D M 77 | 5D ] 93 | 6D m 109 | 7D } 125 | 8D = 141 | 9D ù 157 | AD ¾ 173 | BD ╜ 189 | CD ═ 205 | DD ▌ 221 | ED ∅ 237 | FD ² 253 |
| 0E 14 | 1E 30 | 2E . 46 | 3E > 62 | 4E N 78 | 5E ^ 94 | 6E n 110 | 7E ~ 126 | 8E À 142 | 9E Û 158 | AE « 174 | BE ╛ 190 | CE ╬ 206 | DE ▐ 222 | EE ε 238 | FE ■ 254 |
| 0F 15 | 1F 31 | 2F / 47 | 3F ? 63 | 4F O 79 | 5F _ 95 | 6F o 111 | 7F SP 127 | 8F § 143 | 9F ƒ 159 | AF » 175 | BF ┐ 191 | CF ╧ 207 | DF ▀ 223 | EF ∩ 239 | FF 255 |

## Code page 865 (Nordic)

| 00 0 | 10 16 | 20 32 | 30 0 48 | 40 @ 64 | 50 P 80 | 60 ` 96 | 70 p 112 | 80 Ç 128 | 90 É 144 | A0 á 160 | B0 ⁞ 176 | C0 └ 192 | D0 ╨ 208 | E0 ∝ 224 | F0 ≡ 240 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 1 | 11 17 | 21 ! 33 | 31 1 49 | 41 A 65 | 51 Q 81 | 61 a 97 | 71 q 113 | 81 ü 129 | 91 æ 145 | A1 í 161 | B1 ⁝ 177 | C1 ┴ 193 | D1 ╤ 209 | E1 β 225 | F1 ± 241 |
| 02 2 | 12 18 | 22 " 34 | 32 2 50 | 42 B 66 | 52 R 82 | 62 b 98 | 72 r 114 | 82 é 130 | 92 Æ 146 | A2 ó 162 | B2 ⁞ 178 | C2 ┬ 194 | D2 ╥ 210 | E2 Γ 226 | F2 ≥ 242 |
| 03 3 | 13 19 | 23 # 35 | 33 3 51 | 43 C 67 | 53 S 83 | 63 c 99 | 73 s 115 | 83 â 131 | 93 ô 147 | A3 ú 163 | B3 ⁞ 179 | C3 ├ 195 | D3 ╙ 211 | E3 π 227 | F3 ≤ 243 |
| 04 4 | 14 20 | 24 $ 36 | 34 4 52 | 44 D 68 | 54 T 84 | 64 d 100 | 74 t 116 | 84 ä 132 | 94 ö 148 | A4 ñ 164 | B4 ⁞ 180 | C4 ─ 196 | D4 ╘ 212 | E4 Σ 228 | F4 ⌠ 244 |
| 05 5 | 15 21 | 25 % 37 | 35 5 53 | 45 E 69 | 55 U 85 | 65 e 101 | 75 u 117 | 85 à 133 | 95 ò 149 | A5 Ñ 165 | B5 ⁞ 181 | C5 ┼ 197 | D5 ╒ 213 | E5 σ 229 | F5 ⌡ 245 |
| 06 6 | 16 22 | 26 & 38 | 36 6 54 | 46 F 70 | 56 V 86 | 66 f 103 | 76 v 118 | 86 å 134 | 96 û 150 | A6 ª 166 | B6 ⁞ 182 | C6 ╞ 198 | D6 ╓ 214 | E6 µ 230 | F6 ÷ 246 |
| 07 7 | 17 23 | 27 ' 39 | 37 7 55 | 47 G 71 | 57 W 87 | 67 g 103 | 77 w 119 | 87 ç 135 | 97 ù 151 | A7 º 167 | B7 ⁞ 183 | C7 ╟ 199 | D7 ╫ 215 | E7 τ 231 | F7 ≈ 247 |
| 08 8 | 18 24 | 28 ( 40 | 38 8 56 | 48 H 72 | 58 X 88 | 68 h 104 | 78 x 120 | 88 ê 136 | 98 ÿ 152 | A8 ¿ 168 | B8 ⁞ 184 | C8 ╚ 200 | D8 ╪ 216 | E8 ϕ 232 | F8 ° 248 |
| 09 9 | 19 25 | 29 ) 41 | 39 9 57 | 49 I 73 | 59 Y 89 | 69 i 105 | 79 y 121 | 89 ë 137 | 99 Ö 153 | A9 ⌐ 169 | B9 ⁞ 185 | C9 ╔ 201 | D9 ┘ 217 | E9 Θ 233 | F9 • 249 |
| 0A 10 | 1A 26 | 2A * 42 | 3A : 58 | 4A J 74 | 5A Z 90 | 6A j 106 | 7A z 122 | 8A è 138 | 9A Ü 154 | AA ¬ 170 | BA ⁞ 186 | CA ╩ 202 | DA ┌ 218 | EA Ω 234 | FA · 250 |
| 0B 11 | 1B 27 | 2B + 43 | 3B ; 59 | 4B K 75 | 5B [ 91 | 6B k 107 | 7B { 123 | 8B ï 139 | 9B ø 155 | AB ½ 171 | BB ⁞ 187 | CB ╦ 203 | DB ▉ 219 | EB δ 235 | FB √ 251 |
| 0C 12 | 1C 28 | 2C , 44 | 3C < 60 | 4C L 76 | 5C \ 92 | 6C l 108 | 7C \| 124 | 8C î 140 | 9C £ 156 | AC ¼ 172 | BC ⁞ 188 | CC ╠ 204 | DC ▄ 220 | EC ∞ 236 | FC n 252 |
| 0D 13 | 1D 29 | 2D - 45 | 3D = 61 | 4D M 77 | 5D ] 93 | 6D m 109 | 7D } 125 | 8D ì 141 | 9D Ø 157 | AD ¡ 173 | BD ⁞ 189 | CD ═ 205 | DD ▌ 221 | ED ∅ 237 | FD ² 253 |
| 0E 14 | 1E 30 | 2E . 46 | 3E > 62 | 4E N 78 | 5E ^ 94 | 6E n 110 | 7E ~ 126 | 8E Ä 142 | 9E Pt 158 | AE « 174 | BE ⁞ 190 | CE ╬ 206 | DE ▐ 222 | EE ε 238 | FE ■ 254 |
| 0F 15 | 1F 31 | 2F / 47 | 3F ? 63 | 4F O 79 | 5F _ 95 | 6F o 111 | 7F △ 127 | 8F Å 143 | 9F ƒ 159 | AF ¤ 175 | BF ⁞ 191 | CF ╧ 207 | DF ▀ 223 | EF ∩ 239 | FF 255 |

## Code page 866 (Cyrillic)

| 00 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | A0 | B0 | C0 | D0 | E0 | F0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 16 | 32 | 0 48 | @ 64 | P 80 | ` 96 | p 112 | А 128 | Р 144 | а 160 | ⁝ 176 | └ 192 | ╨ 208 | р 224 | Ё 240 |
| 01 | 11 | 21 | 31 | 41 | 51 | 61 | 71 | 81 | 91 | A1 | B1 | C1 | D1 | E1 | F1 |
| 1 | 17 | ! 33 | 1 49 | A 65 | Q 81 | a 97 | q 113 | Б 129 | С 145 | б 161 | ▒ 177 | ┴ 193 | ╤ 209 | с 225 | ё 241 |
| 02 | 12 | 22 | 32 | 42 | 52 | 62 | 72 | 82 | 92 | A2 | B2 | C2 | D2 | E2 | F2 |
| 2 | 18 | " 34 | 2 50 | B 66 | R 82 | b 98 | r 114 | В 130 | Т 146 | в 162 | ▓ 178 | ┬ 194 | ╥ 210 | т 226 | Є 242 |
| 03 | 13 | 23 | 33 | 43 | 53 | 63 | 73 | 83 | 93 | A3 | B3 | C3 | D3 | E3 | F3 |
| 3 | 19 | # 35 | 3 51 | C 67 | S 83 | c 99 | s 115 | Г 131 | У 147 | г 163 | │ 179 | ├ 195 | ╙ 211 | у 227 | є 243 |
| 04 | 14 | 24 | 34 | 44 | 54 | 64 | 74 | 84 | 94 | A4 | B4 | C4 | D4 | E4 | F4 |
| 4 | 20 | $ 36 | 4 52 | D 68 | T 84 | d 100 | t 116 | Д 132 | ф 148 | д 164 | ┤ 180 | ─ 196 | ╘ 212 | ф 228 | Ї 244 |
| 05 | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 95 | A5 | B5 | C5 | D5 | E5 | F5 |
| 5 | 21 | % 37 | 5 53 | E 69 | U 85 | e 101 | u 117 | Е 133 | Х 149 | е 165 | ╡ 181 | ┼ 197 | ╒ 213 | х 229 | ї 245 |
| 06 | 16 | 26 | 36 | 46 | 56 | 66 | 76 | 86 | 96 | A6 | B6 | C6 | D6 | E6 | F6 |
| 6 | 22 | & 38 | 6 54 | F 70 | V 86 | f 103 | v 118 | Ж 134 | Ц 150 | ж 166 | ╢ 182 | ╞ 198 | ╓ 214 | ц 230 | Ў 246 |
| 07 | 17 | 27 | 37 | 47 | 57 | 67 | 77 | 87 | 97 | A7 | B7 | C7 | D7 | E7 | F7 |
| 7 | 23 | ' 39 | 7 55 | G 71 | W 87 | g 103 | w 119 | З 135 | Ч 151 | з 167 | ╖ 183 | ╟ 199 | ╫ 215 | ч 231 | ў 247 |
| 08 | 18 | 28 | 38 | 48 | 58 | 68 | 78 | 88 | 98 | A8 | B8 | C8 | D8 | E8 | F8 |
| 8 | 24 | ( 40 | 8 56 | H 72 | X 88 | h 104 | x 120 | И 136 | Ш 152 | и 168 | ╕ 184 | ╚ 200 | ╪ 216 | ш 232 | ° 248 |
| 09 | 19 | 29 | 39 | 49 | 59 | 69 | 79 | 89 | 99 | A9 | B9 | C9 | D9 | E9 | F9 |
| 9 | 25 | ) 41 | 9 57 | I 73 | Y 89 | i 105 | y 121 | Й 137 | Щ 153 | й 169 | ╣ 185 | ╔ 201 | ┘ 217 | щ 233 | • 249 |
| 0A | 1A | 2A | 3A | 4A | 5A | 6A | 7A | 8A | 9A | AA | BA | CA | DA | EA | FA |
| 10 | 26 | * 42 | : 58 | J 74 | Z 90 | j 106 | z 122 | К 138 | Ъ 154 | к 170 | ║ 186 | ╩ 202 | ┌ 218 | ъ 234 | · 250 |
| 0B | 1B | 2B | 3B | 4B | 5B | 6B | 7B | 8B | 9B | AB | BB | CB | DB | EB | FB |
| 11 | 27 | + 43 | ; 59 | K 75 | [ 91 | k 107 | { 123 | Л 139 | Ы 155 | л 171 | ╗ 187 | ╦ 203 | ▉ 219 | ы 235 | √ 251 |
| 0C | 1C | 2C | 3C | 4C | 5C | 6C | 7C | 8C | 9C | AC | BC | CC | DC | EC | FC |
| 12 | 28 | , 44 | < 60 | L 76 | \ 92 | l 108 | \| 124 | М 140 | Ь 156 | м 172 | ╝ 188 | ╠ 204 | ▄ 220 | ь 236 | № 252 |
| 0D | 1D | 2D | 3D | 4D | 5D | 6D | 7D | 8D | 9D | AD | BD | CD | DD | ED | FD |
| 13 | 29 | - 45 | = 61 | M 77 | ] 93 | m 109 | } 125 | Н 141 | Э 157 | н 173 | ╜ 189 | ═ 205 | ▌ 221 | э 237 | ¤ 253 |
| 0E | 1E | 2E | 3E | 4E | 5E | 6E | 7E | 8E | 9E | AE | BE | CE | DE | EE | FE |
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